



NORTHERN NIGERIA

MINISTRY OF HEALTH

RURAL HEALTH REPORT 1966

Including:—

Annual Report of the Sleeping Sickness Service for 1966

Annual Report of the Medical Field Units for 1966

PRINTED BY THE GOVERNMENT PRINTER, KADUNA
1967

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I N T R O D U C T I O N

The form of this Report follows the pattern used in recent years. There was no change in the policy of the Preventive Service during the period under review. The Rural Health Section's strength was depleted during 1966 by the resignation of one Medical Officer and two Entomologists, the interdepartmental transfer of another Medical Officer and the absence on leave and post-graduate course of the substantive holder of the present reporter's post.

Further loss of personnel, only of a temporary character it is to be hoped, has been occasioned by the political disturbances which shook the smooth working of the Service in the country in 1966.

The "wind of change" which blew at gale force from the early months of 1966, swept from the Section no less than 37 staff members of which 23 were supervisory personnel of the Inspectorate grade and above.

This depletion of staff made the work of those remaining devoted ones more arduous. They took the extra responsibilities on their shoulders and discharged their duties with zeal and interest. It is to the credit of these sincere staff that in spite of the shortage of experienced personnel efforts were made to carry on the Rural Health Service as if no emergency had arisen. Steady progress was maintained in all fields of activities which will be noticed from this report.

(DR. Z.Q. SHAIKH),
Ag. Principal Health Officer,
Rural Health.



RURAL HEALTH REPORT, NORTHERN NIGERIA, 1966.

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RURAL HEALTH REPORT - 1966.

1. GENERAL AND ADMINISTRATIVE.

1.1 Organisation of the Preventive Services Division.

There was no major change during the year; the position was as shown diagrammatically on page 4.

1.2 Senior Staff General.

Dr. Z.Q. Shaikh handed over his appointment as Principal, Medical Auxiliaries Training School, Kaduna, before proceeding on leave, to Dr. M.O. Shona who took over as Acting Principal with effect from 14th March 1966.

On returning from leave, Dr. Shaikh assumed duties as Acting Principal Health Officer (Rural Health) on 14th July 1966, vice Dr. K.D.B. Thomson, O.B.E., who took leave and a post-graduate course in Public Health in the United Kingdom, on 12th August 1966.

Dr. G.G. Bhure, Medical Officer, Argungu, departed on leave on 22nd July 1966; on his return to Northern Nigeria was transferred to the Urban Health Section of this Division.

1.3 Senior Staff - joining the Service.

Dr. C.L. Crawford recruited as Medical Officer, Special Grade (Leprosy), arrived in May 1966. He was posted to the Government Provincial Leprosy Settlement at Zaria as Medical Officer incharge.

Dr. A.M. Shalaby, appointed as a Rural Medical Officer, arrived in November 1966. He was posted to Yaws Control and Rural Health Development Project duties at No.6 Medical Field Unit, Idah.

1.4 Senior Staff - retirements.

Dr. M.I. Lander, who had been a lecturer at the Medical Auxiliaries Training School, Kaduna, resigned his appointment and departed for the United Kingdom in June 1966. He joined the staff of the Medical Auxiliaries Training School under the U.K. Technical Assistance Scheme in April 1965.

Mr. D.A. Turner, Entomologist, who had been attached to the Sleeping Sickness Service since November 1964, resigned in July 1966 and returned to the United Kingdom. He had been seconded to Northern Nigeria under the U.K. Technical Assistance Scheme.

Mr. K.F. Fraser, Entomologist, also seconded under the U.K. Technical Assistance Scheme, resigned from the Service and left for England in May 1966. He had been attached to the Simulium Control Unit since January 1965.

1.5 Junior Staff - recruits.

Twenty Government-sponsored students qualified from the Medical Auxiliaries Training School, Kaduna, during the year, and were designated Medical Field Unit Assistants.

1.6 Staff - losses.

46 M.F.U./S.S.S./Leprosy Service Staff (of all grades) were lost to the Service during the year:

M.F.U.	-	1, Senior Superintendent left on repatriation leave.
		11, Superintendents -do-
		4, Inspectors -do-
		4, 1st Class Assistants -do-
		3, 3rd Class Assistants resigned for personal reasons.
S.S.S.	-	2, Superintendents left on repatriation leave.
		1, Assistant Superintendent died.
		4, Inspectors left on repatriation leave.
		14, 1st Class Assistants (10 on repatriation leave; 4 retired.
		1, 2nd " " died.
Leprosy Service	-	1, Asst. Superintendent died.

1.7 Establishment.

The staff disposition of the Rural Health Section at 31st December 1966 is shown on the schedule on the next page.

RURAL HEALTH ANNUAL REPORT - 1966.

Establishment - Rural Health Section.

<u>Post</u>	<u>Establishment 1966-67</u>	<u>Actually present 31st Dec. 1966</u>
PHO/Rural Health	1	1
M.Os.H/M.Os/R.M.Os.	6	2
M.Os/SSS	2	1
P.M.O. (Leprosy)	1	-
Sen.Consult. or Consultant(Lep.)	1	-
M.O's (Leprosy)	3	1
Principal M.A.T.S.	1	1
M.Os (Lecturers) M.A.T.S.	2	-
Consultant (T.B.)	1	1
Medical Officers (T.B.)	2	-
Entomologists	5	1
Sen.R.H.Supts. M.F.U.	2	1
" " S.S.S.	2	2
" " Leprosy	2	1
" " Malaria	1	1
" " M.A.T.S.	1	1
R.H.Supt.; Asst.Supt.; Asst.R.H.Supts. in training, MFU	15	4
" " S.S.S.	8	1
" " Leprosy	15	7
" " Malaria	1	-
" " M.A.T.S.	6	3
" Nutr. Unit	1	1
Principal Tsetse Control Officer	1	1(Acting)
Senior Tsetse Control Officer	2	1
Tsetse Contr.Officers, Asst.C.O's., Asst.Control.Officers in training	19	18
Inspectors, M.F.U.	13	9
" S.S.S.	18	11
" Leprosy	15	14
" M.A.T.S.	3	3
" Tsetse Control	12	4
1st, 2nd, 3rd Cl. Assts. M.F.U.	123	96
" " " " S.S.S.	134	102
Assistants, Leprosy Service	15	14
1st, 2nd, 3rd Cl. Tsetse Control Assistants	78	62

Plus Laboratory technicians and attendants, artisans, storekeepers and other subordinate staffs.

PERMANENT SECRETARY

CHIEF MEDICAL OFFICER
PREVENTIVE SERVICES DIVISION

PRINCIPAL HEALTH OFFICER
RURAL HEALTH

PRINCIPAL HEALTH OFFICER
URBAN HEALTH

S.S.M.O.
PRINCIPAL CONTROL OFFICER

SNR. SUPT. (RH)
LEPROSY

SLEEPING SICKNESS
SERVICE

S.S.M.O.
S.S. TREATMENT
STAFF

ENTOMOLOGIST
TSETSE CONTROL
STAFF

LEPROSY SERVICE
M.O. LEPROSY
LEPROSY CONTROL
STAFF

RURAL HEALTH
UNITS.
RURAL M'OS,
RURAL HEALTH
CENTRES
M.F. U.S

SIMULIUM CONT.
SIM. CONTROL STAFF
S.S.S/M.F.U.

T.B. UNIT
CONSULTANT
T.B. UNIT
STAFF
M.F. U.

MEDICAL AUX. TRNG.
SCHOOL
PRINCIPAL
TEACHING STAFF

2.

TRAINING.

2.1 Eighty students sponsored by Native Authorities in Northern Nigeria commenced their year for the two year Basic Course at the Medical Auxiliaries Training School, Kaduna, in April 1966. The second year batch for the same course consisted of 63 N.A. and 10 Government students. In all there were 153 students attending the Basic Course during 1966.

The final examination for the second year basic course students who commenced their training in April 1964 was held in February; the result was as follows:-

<u>Sponsoring Authority</u>	<u>No. of candidates who took the examination</u>	<u>No. of successful candidates.</u>
Government	21	17
Native Authority	56	47
Voluntary Agencies (Trained at various Mission Training Centres)	<u>14</u>	<u>10</u>
Total	<u>91</u>	<u>74</u>

The 17 failures were re-examined in July and the following passed:-

Government	- 3
Native Authority	- 5
Voluntary Agencies	- 2

All successful Government candidates were designated Medical Field Unit Assistants.

Two N.A. Leprosy Attendants Courses, each of two months duration, were held during the year - Course No.16 from February to April, and Course No.17 from May to July. 30 out of 39 candidates qualified as Leprosy Attendants in April, and all the 34 passed the Leprosy Attendants examination in July.

An Assistant Leprosy Inspectors Course for N.A. and Government Leprosy staff was also commenced during the year. It started on 3rd October and the final examination is scheduled for April 1967.

2.2 Teaching Staff.

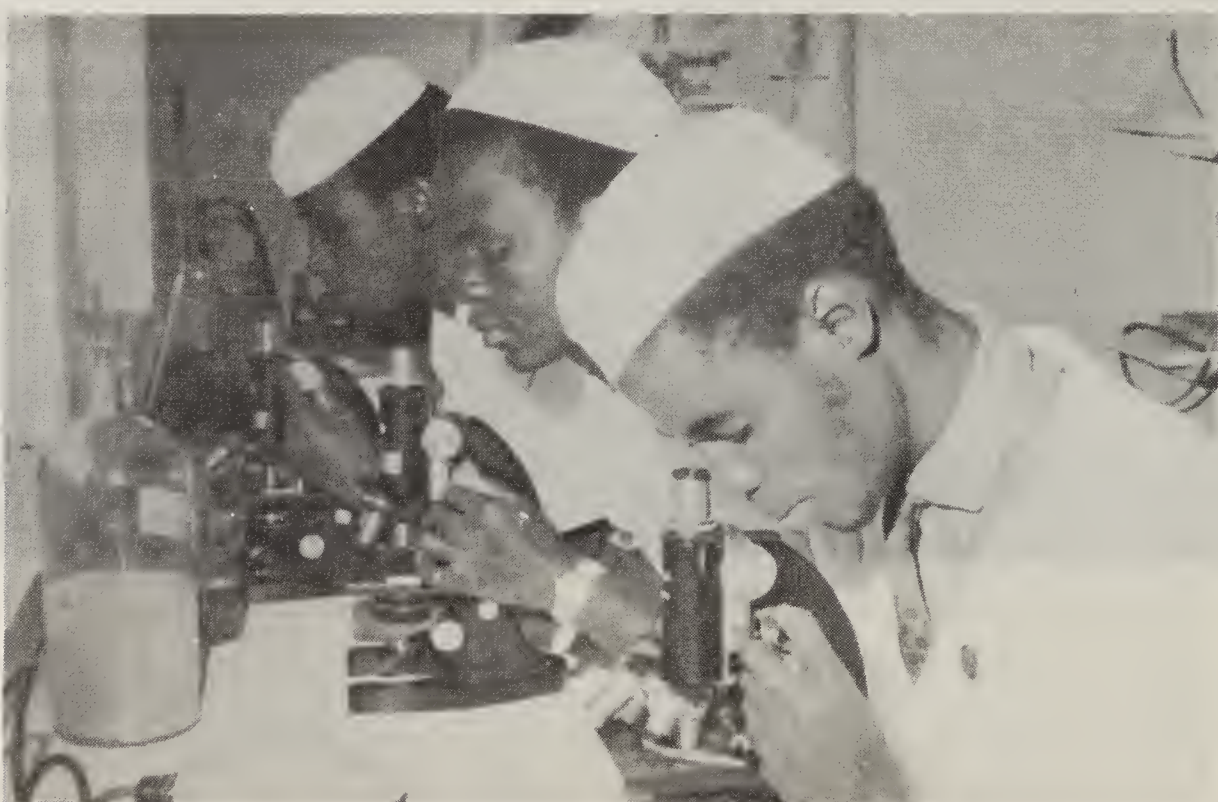
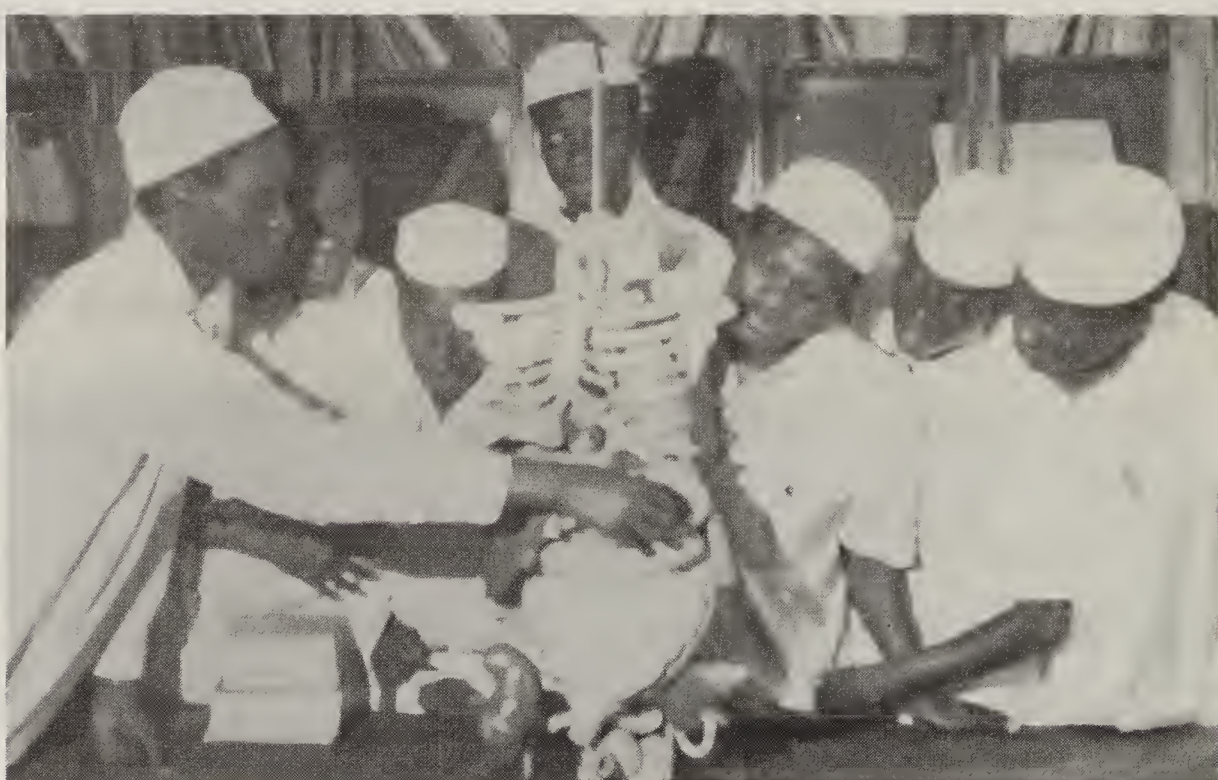
As previously mentioned, Dr. M.I. Lander, lecturer, resigned his appointment with the Ministry and left for the United Kingdom in June 1966. The vacancy had not be filled at the end of the year, but the W.H.O. Public Health Adviser (Administration), Dr. M. Sham-suddin, attached to the Ministry, filled the gap in the teaching staff created by Dr. Lander's departure. Other Medical Officers from the Ministry Headquarters lent a hand too in teaching at the School. Dr. J.S. Dodge, Consultant Malariologist, gave a course of lectures on vector-borne diseases. There was a further depletion of teaching staff during the latter part of the year due to the country-wide disturbances which have been reported elsewhere: two Senior and three Junior teaching-staff members left for their places of origin in Southern Nigeria. Notwithstanding these shortages of staff and other difficulties encountered during the period under review, the teaching schedules were maintained with remarkably little dislocation. At the close of the year teaching staff at Medical Auxiliaries Training School consisted of:-

Acting Principal,

- 1, WHO Public Health Adviser (Temporary),
- 1, Senior Superintendent Rural Health,
- 2, Supts./Asst. Supts., Rural Health,
- 3, MFU/Lep. Inspectors,
- 3, Lep. Laboratory Attendants.



1. Medical Auxiliaries Training School, Kaduna
 2. Students Hostel.



3. M.A.T.S. Students in Classrooms.

3. MEDICAL FIELD UNITS/RURAL HEALTH CENTRES.

3.1 No.1 Medical Field Unit, Makurdi.

This Unit which was supervised by a Senior Superintendent Rural Health in the past was in charge of a Rural Health Superintendent from September onwards. It was engaged on the WHO/UNICEF assisted Yaws campaign in the Benue, Plateau, Zaria and Sardauna Provinces. During the year 1966 the resurvey teams examined 434,620 people and treated 22 infectious yaws cases and their contacts. Further details of the Yaws campaign are given in the relevant Section of this Report. During the yaws surveys 167 Leprosy cases were noted who were referred to the nearest Leprosy Clinics for treatment, and 429,834 people were vaccinated against Smallpox. Treatments for other minor illnesses and injuries were also carried out by the team in their area of operations.

3.2 No.2 Medical Field Unit, Jalingo.

This Unit which operates in the Adamawa and Sardauna Provinces was in charge of a Rural Health Superintendent throughout the year, and was employed on Yaws Resurveys, vaccination against Small pox and Leprosy case finding. Personnel of the Sleeping Sickness Service are attached to the Unit for the control of Sleeping Sickness in the area. During the year a total of 147,060 people were examined for yaws by the M.F.U. staff and 12 infectious and 1,640 active yaws cases were recorded.

In the same period 120,721 people were vaccinated against Smallpox, and 63 Leprosy cases detected referred to the nearest Leprosy Clinics for treatment. Treatments for other minor diseases and injuries were also given by the Unit's staff on tour.

3.3 No.3 M.F.U. and Rural Health Centre, Argungu.

Dr. G.G. Bhure left the Unit on leave and transfer in July, and from then until the end of 1966 the Unit and Rural Health Centre was in the care of a Rural Health Superintendent. In the absence of a Medical Officer, the Centre was visited regularly by the Medical Officer of Health in charge of the Mass Malaria Control Campaign based at Birnin Kebbi. Unfortunately there was no Health Sister available either during the year to visit the Maternity and Child Welfare Clinic at this Centre.

Supervision of N.A. dispensaries, Leprosy Clinics and N.A. Health Departments in the area is conducted by the staff of the Rural Health Centre, who are also responsible for Health Education propaganda at the Centre and in the 8 N.A. Districts of the medical area. Domiciliary visits are made by the unit's resident midwife and community attendants. The local Health Committee continued to meet monthly. This Committee organised a "Health Week" in Argungu township in the early part of the year during which street and compound sweeping and general tidying-up was carried out by communal effort as was also well-cleaning and anti-mosquito breeding measures. The Health Week met with much enthusiasm and was so successful that the "week" was extended to a "once monthly seven-day clean-up campaign" that went on for nearly six months before the enthusiasm began to wane and finally peter-out: this was partly due to the onset of the farming and rainy season. It is hoped to repeat the exercise in 1967.

There was a total attendance of 35,516 cases seen at the out-patients department, of which 152,294 were new cases. 240 cases were admitted to the Centre's sick rest house - 152 males and 88 females; 103 of these cases were transferred to the General Hospital, Birnin-Kebbi. At the Isolation Hospital of the Centre 91 cases of C.S.M. with 4 deaths, and 18 cases of Smallpox with one death were treated. The Maternity and Child Welfare Clinic reported that during the period under review 1937 expectant mothers were seen, 137 deliveries attended to, 14,950 children examined and 2,780 home visits made by the Community Nurses and the Midwife.

The N.A. Health staff under the supervision of the Officer in charge Rural Health Centre and the other Government personnel of the Unit vaccinated 48,604 people against Smallpox of which 86.7% were successful takes.

3.4 No.4 Medical Field Unit, Keffi.

The Unit was in the charge of a Rural Health Superintendent during the year. Yaws resurveys continued in Benue, Niger and Kabba Provinces combined with vaccination against Smallpox, Leprosy case finding and treatment of other diseases and injuries.

A total of 102,374 people were examined for yaws and 22 infectious cases found. The Unit sent out a team to the Nigerian Sugar Company Ltd., at Bacita in Ilorin Province during

the year as a follow up for the previous survey on Urinary Bilharzia: 104 samples were examined and 21 found to be infected with S.haematobium. Further details of the survey are given in the Section of this Report dealing with Schistosomiasis. During the yaws surveys 73,489 people were vaccinated against Smallpox by the Unit during the period in question.

3.5 No.5 Medical Field Unit and Rural Health Centre, Kankiya.

No Rural Medical Officer was available for this Unit which continued to be under the administrative charge of an Urban Health Superintendent assisted by a M.F.U. Inspector and other Rural Health staff throughout the year. The Medical Officers of the W.H.O. Insecticide Research Team based on Kankiya Rural Health Centre extended their profession advice to the Centre's staff in cases of emergency. The Health Sister from Katsina during the absence on leave of the Kankiya Health Sister visited the Maternity and Child Welfare Clinic at the Centre regularly, and conducted ante-natal and child welfare clinics in six N.A. districts in the area.

The Unit provided practical training facilities to the Kano School of Hygiene students in environmental hygiene and sanitary improvements and instruction in Health education propaganda which they conducted in the area.

The report of the Health Centre's activities during 1966 include the following figures:-

Total out-patients treated	- 38,013
Total Smallpox vaccinations (incl. those carried out in M.C.W. clinics and by N.A. Health Staff)	- 14,983
Total attendances C.W. Clinics	- 46,280
" " A.N. Clinics	- 6,962

3.6 No.6 Medical Field Unit, Idah.

This Unit, which was administered by a Rural Medical Officer throughout the year, was mainly engaged in detection and treatment of yaws cases and their contacts in Igala and Idoma Divisions of Kabba and Benue Provinces. In addition to this the staff also carried out vaccination against Smallpox in the areas they surveyed for yaws.

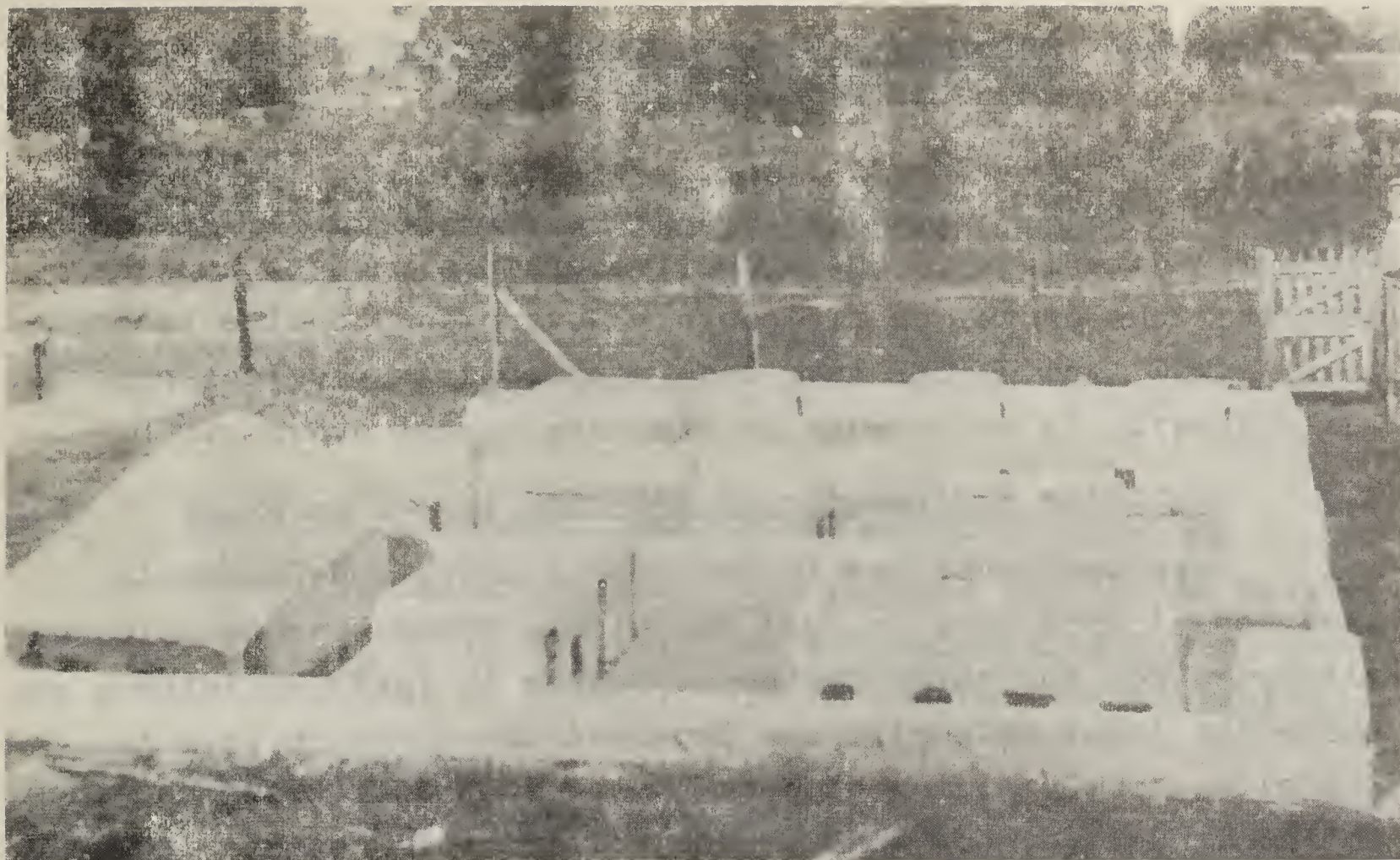
The total number of persons examined for yaws in the Igala-Idoma areas during the year was 393,310, of which 120 were infectious cases. Further details are embodied in the "Yaws" section of this Report. 285,371 vaccinations against Smallpox were performed by the Unit staff, and the 122 Leprosy cases diagnosed were referred to the nearest Leprosy Clinics for treatment.



4. Rural Health Centre, Kankiya.



5. Child Welfare Clinic, R.H. Centre, Kankiya.



6. Model Compound.



7. Model Sanitary Structures, R.H. Centre, Kankiya.

4. RURAL HEALTH DEVELOPMENT PROJECT:
IGALA - IDOMA SCHEME.

4.1 The Rural Medical Officer at Idah is also in direct control of the W.H.O./UNICEF assisted RURAL HEALTH DEVELOPMENT Project - Nigeria 23. The objective of this project and the contributions of the participants - Government, Native Authorities, W.H.O. and UNICEF have been mentioned in previous reports. The following is an account of its development during 1966.

4.2 Building Programme - Government.

The two Rural Health Centres at Ankpa and Otukpa in the Project area were in full function. Funds have been allocated for the third Centre at Dekina in Igala Division where the local authority has improved the approach road to the site. The Ministry of Works has been requested to commence the construction, but work on the building had not started at the end of the year.

During the period under review both the Rural Health Centres at Ankpa and at Otukpa were managed either by an Urban or Rural Health Superintendent, as available, under the direct supervision of the Rural Medical Officer in charge Medical Field Unit, Idah. The Health Sister from Idah also periodically visited the maternity and child welfare clinics at these Centres, as well as N.A. clinics and maternity homes in the project area.

As in other Rural Health Centres in Northern Nigeria, the main activities were in the out-patient's departments, clinical laboratories, anti-natal and Child Welfare clinics and in domiciliary visits by community nurses. Health education propaganda was disseminated in the Centres by the Health Sister and local Government and N.A. staff; food and cookery demonstrations was also given wherever practicable. Posters and other instructional visual aids were used; the Ankpa Centre has a model compound layout adjacent as part of its Health Education exhibits. The Health staff attached and seconded for training were responsible for the propagation of Health Education throughout the area and for environmental and sanitary improvements thereat; meat inspection and control of insect vectors is included in their schedules.

Immunization against Smallpox, whooping cough, tetanus and diphtheria was carried out at the Child Welfare Clinics and high protein milk, "Arlac", was distributed to undernourished children free of charge. From the returns submitted by the

Ankpa and Otukpa Centres for the work done during 1966 the following combined figures have been extracted:-

Total attendances at out-patient departments	=	35,625
" patients treated in the sick rest-houses	=	287
" attendances at ante-natal clinics	=	10,112
" attendances at Child Welfare clinics	=	14,767
" deliveries at Centres	=	214

4.3 Building Programme - Native Authority.

No new building programme was carried out by the Native Authority during 1966. My last year's Rural Health Report gave the present position in detail: the following is a summary:-

Igala Division.

This division has 13 dispensaries in the project area, of which 5 have Maternity and Child Welfare Clinics attached. Rural Health Centre Ankpa, is the centre of activity for this area.

Idoma Division.

There are 8 dispensaries in this Division with only one having Maternity and Child Welfare Clinic facilities. These dispensaries are served by the Rural Health Centre at Otukpa.

4.4 Personnel - Government.

The strength of the Government staff engaged on the Project and for the yaws campaign in the area was adequate during the first half of the year. Due to the political disturbances in the latter part of the year, which resulted in some of the staff being repatriated to their places of origin in Southern Nigeria, there was a shortage of trained personnel for both the development Project and the yaws campaign.

There has been a Rural Medical Officer at Idah throughout the period to be in charge of the Project. At the end of the year other Government staff concerned with this Project and for the yaws campaign were:-

- 1 Health Sister.
- 1 Assistant Rural Health Superintendent.
- 9 M.F.U. Staff working at the Rural Health Centres.
- 8 M.F.U. Staff engaged on the Yaws campaign
- 1 Midwife (at Oturpo)
- 2 Community Nurses (one at each Health Centre).
- 2 Urban Health Superintendents.
- 1 Health Inspector.
- 12 Health Assistants.
- 1 Latrine construction crew, and
- 1 Workshop crew.

Mr. Guy Tanyan, Sanitary Engineer, assumed duty in July 1966. As there was no work in hand on the installation of wells, etc. in the Project area, he was later transferred to the School of Hygiene, at Kano. There he took part in teaching the students and also acted as adviser to the Kano Native Administration on matters of environmental hygiene. Mr. Tanyan also advised this Ministry on the problem of disposal of industrial effluents.

Personnel - Native Administration.

The strength of the N.A. Staff engaged on Rural Health activities in the Project area during the year was satisfactory. In the Igala Division there were 27 qualified dispensary assistants and one in training at the Medical Auxiliaries Training School, Kaduna. Other staff included:-

Community Nurses	1 plus one in training
Midwives Grade II	8
Leprosy Inspectors	3
Leprosy Attendants	4
Health Inspectors	2
Health Assistants	10
Yaws Scouts	9

Idoma Division has 25 qualified dispensary assistants and other staff were:-

Community Nurse	1 plus two in training
Midwives Grade II	1
Leprosy Inspectors	3
Leprosy Attendants	8
Health Inspectors	2
Health Assistants	7
Yaws Scouts	15.

4.7 Planning and Development of a Comprehensive environmental Sanitation Programme.

There was no sanitary engineer for the first six months of the year, and later when he was available no real programme on improvement of environmental sanitation was undertaken due to lack of finances on the part of Igala N.A. to provide funds for construction and maintenance. The position regarding the water supplies to the Project remains as described in the 1965 Rural Health Report.

4.8 Community Planning and Housing.

It was hoped to construct model houses made of Local Materials at the Otukpa Centre similar to those already erected at Ankpa but due to the Native Authority being at the time beset with more pressing matters and lacking the necessary staff this intention is held in abeyance.

4.9 Community Nurses Training Centre, Kaduna.

23 students were in training at this Centre during the year. 16 students sat for the prescribed examination and 15 passed - 10 Government and 5 N.A. sponsored.

4.10 Health Education.

Needless to say progress here too marked time during the year. The Health Education Unit from Zaria was to visit the Project area and carry out the necessary programme of propaganda and education arranged to precede the mass latrine construction drive planned to be put into operation in 1966. This exercise had, unfortunately, to be postponed until more settled conditions prevail.

TUBERCULOSIS UNIT.

5.1 The Tuberculosis Unit which is located at the General Hospital, Jos, had the following staff at the end of 1966 to carry out the Control of the disease:

- (i) The Consultant (T.B.),
- (ii) 1 Rural Health Superintendent,
- (iii) 12 M.F.U. Assistants and the other necessary maintenance staff - clerical, drivers, etc.

On the treatment aspect of the disease there were three Nursing Superintendents attached to the Unit one of whom was seconded after training to the T.B. wards in the Kaduna General Hospital. Short courses of instruction are held at the T.B. Unit for trained nurses with a view to their posting to Hospitals with T.B. wards. There were four wards for T.B. patients in the Jos General Hospital with a total of 90 beds including 12 for children, the nursing staff of which were under the direct supervision of the Consultant (Tuberculosis). X-Ray and laboratory facilities of the General Hospital were used. Four out-patient T.B. clinics in the Jos area were held fortnightly by a T.B. trained Nursing Superintendent assisted by staff nurses and M.F.U. Assistants under direction of the Consultant; these provided out-patient treatment for 10,576 patients during the year.

The preventive work on Tuberculosis mainly consisted of B.C.G. vaccination to selected population groups, viz

- (i) new born babies at Jos & Kaduna Hospitals,
- (ii) children attending Child Welfare Clinics,
- (iii) school children,
- (iv) Teachers,
- (v) Government and N.A. officials with their families,
- (vi) Public Health Staff,
- (vii) Contacts of T.B. patients.

Due to the shortage of staff the mass B.C.G. vaccination programme for the rural areas was limited to Idoma, Nassarawa, and Keffi in Benue Province and to Jos in Plateau Province.

The M.F.U. Assistants attached to the Health Offices at Kaduna and Kano also took part in Tuberculosis testing and B.C.G. vaccination in these townships.

In all 92,949 individuals were tuberculin tested and 62,719 were given B.C.G. vaccination during 1966.

The detailed work done by this Unit for the whole Region is given on the following page.

T.B. Wards Jos.

No. of T.B. patients admitted to wards:	227
No. of patients discharged after disease being arrested:	202
No. of deaths from T.B. in Hospital:	37
No. of patients attending O.P. Clinic:	6,058
Total number of new T.B. patients diagnosed:	277
Total No. T.B. patients attending Clinics in Jos Medical Area.	4,518

<u>Preventive.</u>	<u>Tuberculin tested.</u>	<u>B.C.G. vaccinations.</u>
New-born babies Jos Maternity wards,	-	1,495
Infants in Child Welfare Clinics,	-	9,046
School children,	40,365	26,081
Teachers, Govt. & N.A. Officials and their families,	2,854	946
Inmates N.A. Prison, Kamuku,	250	191
O.P.D. Jos, Contacts and referred cases	7,354	2,350
M.O.H. Office, Kano,	1,547	325
M.O.H. Office, Kaduna,	12,978	10,886
Mass campaigns, Benue and Plateau Provinces,	27,601	11,399
T O T A L S =	<u>92,949</u>	<u>62,719</u>

6.1 The Government Leprosy Unit continued to be the advisory and supervisory body for the Native Authorities and Mission Institutions which actually carried out the treatment of Leprosy patients in their clinics and Settlements.

The gap created by the departure of Dr. D.I. Leiker the previous year, was filled by the appointment of Dr. C.L. Crawford, Medical Officer, Special Grade, who joined the Leprosy Service in May 1966 and was posted as Medical Officer in-charge of the Government Provincial Leprosy Settlement, Zaria.

The Unit had the following staff during the reporting year:-

- 1, Medical Officer (Special Grade) (Leprosy)
from May 1966.
- 1, Senior Superintendents Rural Health (Leprosy).
- 8, Rural Health Superintendents and Asst. Superintendents.
- 14, Rural Health Inspectors (Leprosy).
- 14, Rural Health Assistants (Leprosy).

The Provincial Leprosarium, Zaria, which was taken over by the Government in the previous year, was used for training purposes for students taking Leprosy courses at the Medical Auxiliaries Training School, Kaduna.

During 1966, 69,552 new patients were registered for treatment at various treatment centres, bringing the total number of patients who received treatment during 1966 to 287,995. During the same period 14,549 patients were discharged from the registers as cured. At the end of 1966 there were 2,008 treatment centres in the Region, 113 new clinics having been opened during the year in review. In the same period 118 Voluntary Agency clinics were handed over to the respective Native Authorities. 14 Leprosy Settlements and 32 leprosy treatment villages in various part of the Region, as mentioned in the previous Report, continued to function.

UNICEF continued its contribution by supplying Dapsone, the standard drug for treatment, and the Transport for the Leprosy work in the Region. During 1966, 336,000 tins of Dapsone tablets were distributed free to the various treatment centres in Northern Nigeria.

The Leprosy control activity in the Region is summarized in the table which follows.

LEPROSY RETURNS 1966.

PROVINCE	LEPER SETTLEMENT	AGENCY	NUMBER OF BEDS	IN PATIENT	OUT PATIENT	TOTAL PATIENT	TOTAL NUMBER TREATMENT CENTRES N.A.	TOTAL NUMBER TREATMENT CENTRES V.A.	TOTAL NUMBER TREATMENT CENTRES NORTHERN NIGERIA.	NEW PATIENTS ADMITTED FOR TREATMENT 1966	TOTAL PATIENTS UNDER TREATMENT DURING 1966.	NUMBER PATIENTS DISCHARGED DURING 1966.
ADAMAWA	GARKIDA	C.B.M.	86	303	136	439	84	31	115	3,201	9,769	1,497
BAUCHI	BANYARA	S.I.M.	32	153	-	153	180	23	203	5,021	29,180	4,615
BENUE	MKAR	S.U.M.	67	232	-	232	290	18	308	10,569	49,232	2,596
BORNU	MALOI	S.U.M.	37	206	231	437	140	8	148	3,373	10,783	699
ILORING	OMU ARAN	S.I.M.	40	297	-	297	66	13	79	1,610	7,120	487
KABBA EAST	OCHADAMU	Q.I.M.	32	100	126	226	64	24	88	1,678	6,837	761
KABBA WEST	OYI-RIVER	S.I.M.	31	160	18	178						
KANO	YADAKUNYA	S.I.M.	54	309	63	372	180	9	189	15,327	51,504	1,265
KATSINA	BABARUGA	S.I.M.	40	437	-	437	83	2	85	6,931	38,799	135
NIGER	CHANCHAGA	S.I.M.	46	71	-	71	220	17	237	5,781	31,455	468
PLATEAU	MONGU	S.U.M.	32	116	30	146	125	58	183	1,977	8,244	791
PLATEAU	ALUSHI	S.U.M.	12	44	39	83						
SARDAUNA	-	-	-	-	-	-	70	1	71	1,541	5,369	383
SOKOTO	AMANAWA	S.I.M.	29	420	30	450	154	9	163	7,906	23,048	143
ZARIA	SAYE	GOVT.	30				107	32	139	4,637	16,656	709
TOTAL			568	2,848	673	3,521	1,763	245	2,008	69,552	287,995	14,549



8-9. Government Leprosy Settlement, Zaria
Hospital Wards (top) and residential huts for patients.



10-11. Leprosy Out-patients treatment Clinics;
at Rural Dispensary (top) and in market area.

7.1 GENERAL REVIEW:-

During the year the perturbed situation of the country had some repercussions on the activities of Bida and Wamba Units of the Sleeping Sickness Service, due to loss of their Senior Supervisory Staff and reduced experienced Staff. In spite of these circumstances, the amount of work carried out by various Units in the Service by the end of the year was considerable, and indeed all the Units must be congratulated for their sense of duty and remarkable continuity of work.

No major change in Treatment Policies, except for Benue Province (Gboko SSS Unit) where, because of difficulty of supervision, all cases, with the exclusion of "Positive" with ascertained C.S.F. normal findings, were to be treated with Melarsen Sodium. Co-operation of the Curative Services was willingly obtained through personal contacts of the Principal Health Officer/Rural Health and Sleeping Sickness Medical Officer with various Medical Officers. Limited therapeutic trials with Mel.B under strict medical supervision started in several General Hospitals on cases referred by our service.

Detection of a major "focus" north of Shendam pointed out further the logistical unsuitability of Wamba as the administrative centre, and it was decided to transfer the main S.S.S. Office from Plateau Province to Barakin Ladi. The construction work of the new S.S. office, within the premises of the General Hospital B/Ladi, commenced during the last months of 1966: the building will be completed before the end of the 1966-67 Financial Year.

A few S.S.S. Inspectors were given their first training in Lumbar Puncture techniques and C.S.F. examination under the direct supervision of the Principal Health Officer/Rural Health and Officers of the N.I.T.R., and became qualified in performing them. Their technique for collection of C.S.F. and results of tests are checked by the Sleeping Sickness Medical Officer and Principal Health Officer/Rural Health when on tour of the areas where these Inspectors are on survey work.

The writer represented Northern Nigeria at the W.H.O. Inter-Regional Seminar on African Trypanosomiasis held in Nairobi, Kenya, from 17th - 29th October 1966, where various aspects of the problem of Trypanosomiasis were discussed with Specialists and experts in various fields of this problem.

(*) The assistance given by Dr. W. Ronga, Medical Officer (Sleeping Sickness), in compiling the diagnosis and treatment section of this report, and in the preparation of the map showing the incidence of Sleeping Sickness in Northern Nigeria, 1966, is gratefully acknowledged.

7.2 RELAPSED AND CLINICAL CASES.

Relapsed cases constitute therapeutic and diagnostic problems, specially one of "Therapeutic failure". Explanations of such failure have been given, not always convincingly, in terms of "insufficient", "delayed", "irregular" or "improper treatments", or even due to "lack of response" to the treatment.

In order to solve the problem of relapsed cases one has to depend on the reliability of the diagnostic capacities of the average Sleeping Sickness Assistants. Relapsed cases are often diagnosed simply on the grounds of any presenting a complaint and a likely history of previous specific treatment. Willingness to administer treatment on the part of a Sleeping Sickness Assistant, and to receive one on the part of the patient, also play a significant role. The staff try their best to obtain information as to the previous diagnosis and the exact treatments received by such patients, but sometimes they are unable to collect all the information required. For this reason a patient who had never shown the parasite in his body (clinical) may be diagnosed as a relapsed case if treatment given failed to improve his condition.

As for "Clinical cases" many Assistants interpret any manifestations of the Central Nervous System involvement, such as epilepsy, cerebral palsy, acute, subacute, typical or atypical forms of meningitis, various encephalopathies, psychoses, insanity and depressive states, as "Clinical" cases. If such cases give a history of any previous treatments for their ailment they are diagnosed as "relapsed" cases.

It is to be noted, incidentally, that under our present policies regarding treatment, there is no limitation to the number of courses of treatment that an Assistant can administer to a patient, provided he is recorded as a relapsed case. Veritable cases of addiction to periodical treatment are noted on inspection.

Even of more concern is the wide-spread inability to recognise not only minor manifestations, but even the most obvious symptoms of drug toxicity. These toxic effects are inclined to be interpreted as deterioration of the condition, or signs of advanced Sleeping Sickness. In Benue Province instances of fatal results have been recorded as a result of three or more courses of arsenical drugs administered to patients.

7.3 THE RELAPSE RATE.

With the present system of reporting and record maintenance, the relapse rate so computed is of very little significance from the point of view of the severity of the disease in an endemic area. Within a year's period it is possible for one individual to be accounted as two cases diagnosed and reported separately (e.g., GP. Positive and 1 relapse, or 1 clinical and 1 relapse, or 1 relapse and 1 relapse). One patient relapsed after an initial treatment with Antrypol - Tryparsamide mixture plus Tryparsamide, reported as one GP Positive and then consequently three times "Relapsed", twice during the same year.

The purpose of ascertaining the Relapse Rate is two fold: firstly to assess the proportion of treatments which fail to cure cases, and secondly to assess the proportion of conditions which recur. For this it is important that correct information as to the number of patients relapsing is known, and not the number of treatments given. It should also be borne in mind that Relapsed cases diagnosed in any one year are always in proportion to the positive cases diagnosed in the previous years, and because of the theoretically unlimited number of Relapsed cases that a single individual can be counted as, such diagnosis are not only clinically unreliable but statistically of no significance.

"New", to indicate positively of a case, is no longer used in this report. The term is arbitrary, as for a particular period a clinical and a relapsed case also could fall into this category. Its association with "early" and "advanced" is also confusing, since the staff in the field are not in a position to sub-classify cases with accuracy without examination of C.S.F.

In this report an attempt is made to create a distinction between positive cases (persons in whom parasites have been detected), and negative cases (cases without demonstrable presence of parasites - namely the Clinical and Relapsed), and emphasis is laid on positive cases only for all discussions and recommendations.

7.4 It is worth mentioning here that the study of the ratio of Positive/Negative cases for a single survey gives valuable information as to the efficiency of the diagnostic capacities of a team and calls for investigation when the ratio falls

below 1:0. When this ratio is computed on the data successively recorded over a number of years for a focus, it can show when such focus may reasonably be considered as under control. Percentage of Positive cases (and not the percentage of total S.S. cases) can constitute useful information on the success or failure of the measures adopted to control the disease.

The following are a few examples:-

Positive/Negative ratio referred to Provinces.

(No. of Positive cases diagnosed for each negative case diagnosed)									
	<u>1958</u>	<u>1959</u>	<u>1960</u>	<u>1961</u>	<u>1962</u>	<u>1963</u>	<u>1964</u>	<u>1965</u>	<u>1966</u>
Adamawa	27.0	30.0	8.8	2.1	3.6	2.0	1.6	0.4	0.7
Benue	1.8	2.0	1.8	1.9	2.6	1.8	1.6	1.4	2.8
Plateau	4.2	3.8	3.3	2.4	1.4	2.4	3.0	2.8	5.0

Ratio Positive/Negative referred to a Focus.

(a) Pitti Focus - (South Lere, Zaria).

<u>1962</u>	<u>1962-63</u>	<u>1963-64</u>	<u>1964</u>	<u>1965</u>	<u>1966</u>
238/nil	200/44	88/74	109/78	67/64	26/37

(b) Gigyara Focus (Duguri District, Bauchi)

<u>1960</u>	<u>1961</u>	<u>1963</u>	<u>1964</u>	<u>1965</u>	<u>1966</u>
18/nil	26/nil	15/5	7/6	4/3	2/5

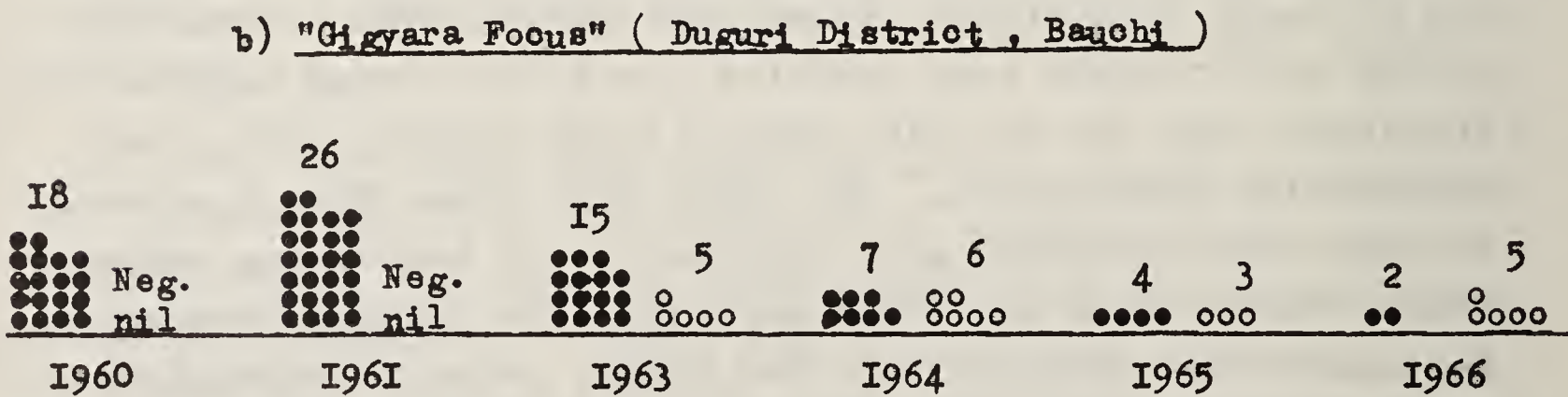
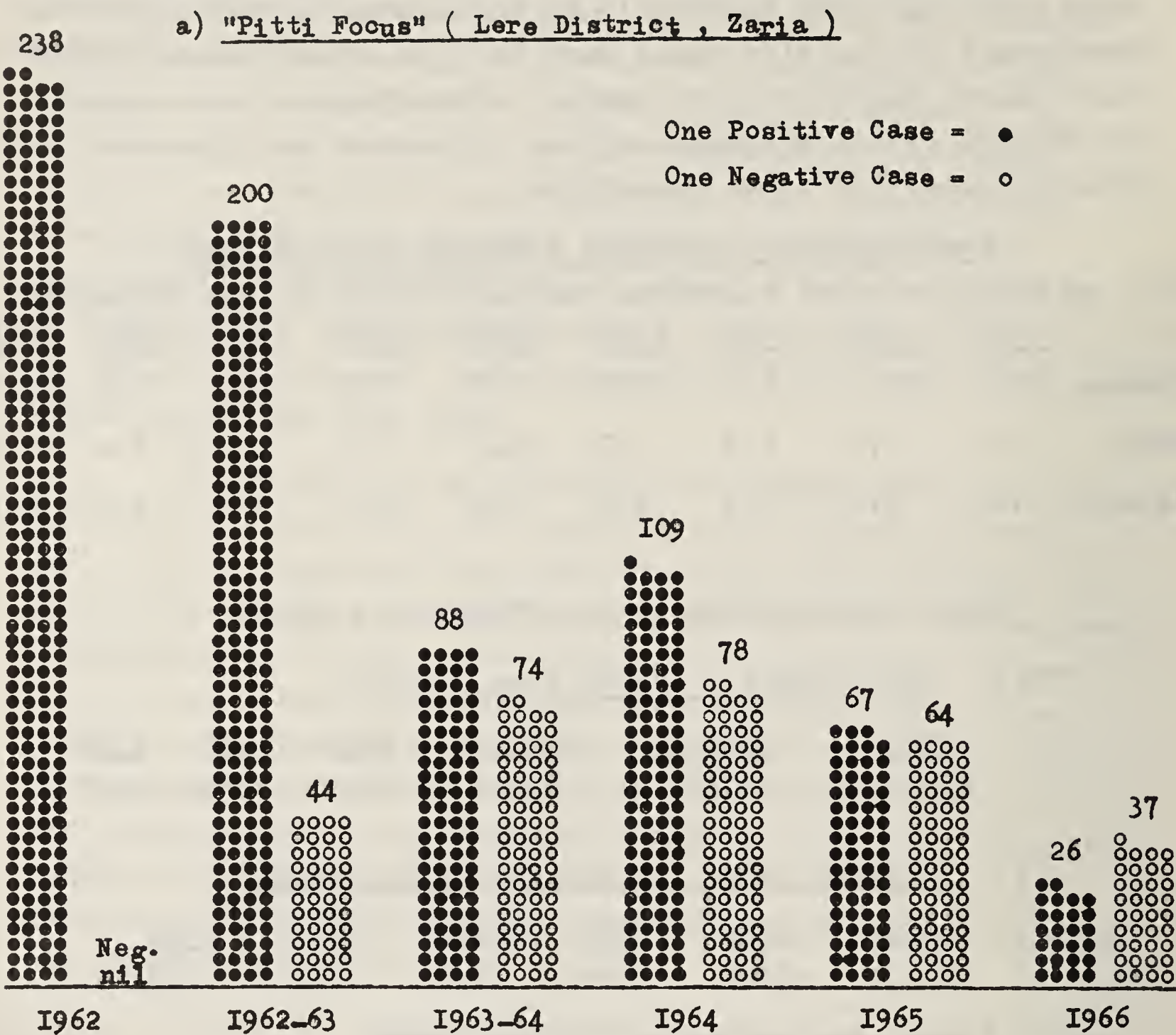
Please see graphs on the next page.

7.5 Examination and Prophylaxis of Groups at Risk.

The Appendix "D" of this report which gives figures for examination and prophylaxis of groups of people at risk due to their occupations, shows that during 1966 a total of 43,308 such persons were examined for infection in various Provinces, and out of this number 13,759 workers were given pentamidine prophylaxis. The table also shows that 7 persons amongst those examined were detected to be harbouring trypanosomes (one of whom was found positive after having received Pentamidine as prophylaxis a few months prior to detection). Unfortunately the returns from various Units on this matter does not clearly indicate whether these cases detected were from amongst those who were already at risk in their jobs, or were amongst the new recruits to the occupations.

When one compares the Positive prevalence rate of the groups at risk (miners, road labourers, etc.) with that of the population of the area, these seems to be no support for presuming that such groups are at a higher risk and call for

POSITIVE & NEGATIVE CASES ("Survey" & "Voluntary")
DIAGNOSED IN TWO FOCI, FOLLOWING THE INITIAL SURVEY



pentamidine prophylaxis. For example, during 1966 the Positive prevalence rate for Groups at risk in Benue Province was 0.04 percent, whereas the same rate for all the population of the endemic area in the same Province was 0.08. During the same year, the Positive prevalence rate for special Groups examined in Plateau Province was 0.01 and that for the population examined during other various surveys was 0.24. The only positive case detected after receiving prophylactic pentamidine was found in a person coming from Shawai, where the positive rate was 4.76%. He had gone to Gwar Gwar to work as a miner where he was given Pentamidine and later on detected as a positive case. This single incidence of failure to give protection after Pentamidine does not help one to come to a definite conclusion as to the ineffectiveness of the drug as a prophylactic agent. It is possible that the case was already infected at Shawai where he was at a much higher risk than at Gwan Gwan, and the single dose of pentamidine was insufficient to clear the infection.

The above findings does suggest the necessity for a change in the policy on the subject. There is no doubt that the activities of the Sleeping Sickness Service Staff on behalf of miners and other labourers must give these employees a sense of protection and care, but it is at the expense of people in endemic areas who are actually at a higher risk and require the services of the S.S. Staff more urgently than those regarded as at risk due to their occupations.

7.6 RECOMMENDATIONS:

It is felt that the reporting and recording system in the Sleeping Sickness Service should be reviewed, and changes made to collect correct information as far as possible. It is the opinion of the writer, that a Card System be introduced. Every person diagnosed as a Sleeping Sickness case should have a personal record card at the office of the Treatment Unit and a copy at the Sleeping Sickness Service Headquarters, on which all the relevant information as to the method of diagnosis, clinical findings, Laboratory reports and the various treatments given must be entered. This would give the prevalence of the disease in an area by number of patients and not by number of treatments given. This system would also help to assess the effectiveness of a drug and the relapse rate for a particular schedule of treatment or for a particular drug.

Considering the toxic effects noted and reported by the Medical Officer (Sleeping Sickness) in patients having repeated courses of Melarsen, it is thought essential that the Sleeping Sickness Staff in the field should not be permitted to give more than two treatment courses of this drug for a single patient. Patients who require further treatment should be examined and treated by Medical Officers acquainted with Sleeping Sickness work.

Recently Sleeping Sickness cases have been reported from areas which were thought to be free from infection after successful control measures, and had not been surveyed for a long time. A more uniform coverage of large areas by surveys is desirable; especially those areas which have had Sleeping Sickness in the past and have not been surveyed for a considerable period - these should be re-surveyed. This would seem possible, logically, only by a careful sampling and greater use of pilot or spot surveys.

7.7 SUMMARY OF CASES DIAGNOSED.

Almost one and a half million population was examined at various surveys including examination of people at risk, such as miners and labourers. 942 cases were diagnosed of which 841 were positive for parasite and 92 were negative. Case prevalent rates for 1966 are:-

Positive Case rate = 58 per 100,000 Population Examined
Negative Case rate = 6 per 100,000 Population Examined
Total Case rate = 65 per 100,000 Population Examined.

Total number of cases diagnosed during 1966 was 1,763 of which 1,310 were parasite positive.

The three major contributions were:-

Benue Province 635 Cases - 36% of total cases
Plateau Province 587 Cases - 33% of total cases
Zaria Province 163 Cases - 9% of total cases.

PROVINCIAL RETURNS
ADAMAWA PROVINCE.

Team Resurveys:

Division	District	Examined	Pos.	Cli.	Rel.	Total	% SS	% Pos.
Adamawa	<u>Gurin</u>	8,619	-	-	-	Nil	0.00	0.00
"	<u>Kilba</u>	4,186	-	-	-	Nil	0.00	0.00
"	<u>Song</u>	2,618	-	-	-	Nil	0.00	0.00
Muri	<u>Bakundi</u> (Jan.)	1,909	4	2	2	8	0.41	0.20
"	" (Dec.)	2,606	1	-	-	1	0.03	0.03
"	<u>Dekka</u>	6,993	2	-	-	2	0.02	0.02
"	<u>Jalingo</u>	2,297	1	-	3	4	0.17	0.04
"	<u>Muri</u>	3,569	1	-	-	1	0.02	0.02
"	<u>Mutum Biyu</u>	5,432	3	-	-	3	0.05	0.05
		44,265	12	2	5	19	0.04	0.02

Dispensary Resurveys:

None reported.

Voluntary Cases:

Division	District	Disp/Hosp./TC.	Pos.	Cli.	Rel.	Total
Muri	<u>Jalingo</u>	Jalingo G.Hosp	-	2	-	2
"	<u>Lau</u>	Didango TC.	-	2	6	8
"	<u>M.Biyu</u>	Mutum Biyu TC.	-	-	1	1
"	<u>Battas</u>	Numan Hosp.	2	-	1	3
			2	4	8	14

Summary of Diagnostic Activities:

	Examined	Pos.	Cli.	Rel.	Total	% SS	% Pos.
Team Resurveys	44,265	12	2	5	19	0.04	0.02
Voluntary Cases		2	4	8	14		
		14	6	13	33		

The main focus in Adamawa Province is Kungana Village Area in Bakundi District of Muri Division. This focus is becoming under control which is evident from the following figures:-

YEAR	NO. OF PEOPLE EXAMINED	POS.CASES DETECTED.
1964	3,356	17
1965	2,047	8
1966	4,515	5

The prevalence rate for the whole Province is progressively declining over the past few years which is proved by the following figures:-

YEAR	NO. OF PEOPLE EXAMINED	POS.CASES DETECTED	% POS.
1964	29,816	75	0.22
1965	23,012	13	0.05
1966	44,265	14	0.03

As previously pointed out, the proportion of negative cases (clinical & relapsed) diagnosed by this Unit (Jalingo Sleeping Sickness Service) is rather high and especially for cases diagnosed at team surveys, which is unusual.

Team Resurveys:

Division	District	No. Examined	Pos.	Cli.	Rel.	Total	% SS	% Pos.
Bauchi	<u>Bula</u>	9,580	6	-	-	6	0.06	0.06
"	<u>Burra</u>	5,604	-	-	-	Nil	0.00	0.00
"	<u>Darazo</u>	16,677	1	-	-	1	0.005	0.005
"	<u>Duguri</u>	1,642	2	-	5	7	0.42	0.12
"	<u>Galambi</u>	5,450	1	-	-	1	0.01	0.01
"	<u>Ganjuwa</u>	4,501	8	-	-	8	0.17	0.17
"	<u>Gwana</u>	7,478	-	-	-	Nil	0.00	0.00
"	<u>Lame</u>	13,237	10	2	2	14	0.10	0.07
"	<u>Warji</u>	15,368	6	-	-	6	0.03	0.03
"	<u>Zungur</u>	6,291	9	-	-	9	0.14	0.14
Gombe	<u>Yamaltu</u>	4,805	9	-	-	9	0.18	0.18
Katagum	<u>Hardawa</u>	5,977	-	-	-	Nil	0.00	0.00
"	<u>Udubo</u>	11,933	-	-	-	Nil	0.00	0.00
"	<u>Yarima</u> (Jul.)	5,843	20	-	-	20	0.34	0.34
"	" (Dec.)	18,800	6	-	1	7	0.03	0.03
		133,381	78	2	8	88	0.66	0.05

Dispensary Resurveys:

Division	District	Disp.	No. Examined	Pos.	Cli.	Rel.	Total	% SS	% Pos.
Bauchi	<u>Bula</u>	Bununu	368	-	-	-	Nil	0.00	0.00
"	<u>Zungur</u>	L.Katag.	2,799	3	-	-	3	0.10	0.10
			3,167	3	-	-	3	0.09	0.09

Examination and Pentamidine Prophylaxis (or Examination only) of Groups considered more "At Risk".

Division /Area:	District /Group:	Pos. in spite of Prophyxs.	Pos. not under Prophyxs.	Total Pos.	Percent Pos.	No. Given Pent.
Bauchi	<u>Lame</u>	-	1	1	0.005	202
Rishi	Mines Labs. & Fam's					
Gombe	<u>Yamaltu</u>	-	-	-	0.00	1,985
	Road & R'Ways Labourers					
		-	1	1	0.004	2,187

BAUCHI PROVINCE (Contd.)

Voluntary Cases:

Division	District	Disp./Hosp./TC.	Pos.	Cli.	Rel.	Total
Bauchi	<u>Bauchi</u>	Bauchi G.Hosp.	4	-	8	12
"	<u>Darazo</u>	Darazo Disp.	-	-	2	2
"	<u>Lame</u>	Pengel Disp.	4	2	-	6
"	<u>Ningi</u>	Ningi Disp.	2	-	2	4
"	<u>Zungur</u>	Lim.Katagum D.	3	-	-	3
Gombe	Gombe	Gombe G.Hosp.	2	-	-	2
Katagum	<u>Katagum</u>	Katagum Disp.	1	-	-	1
"	<u>Madara</u>	Azare G.Hosp.	3	2	2	7
			19	4	14	37

Summary of Diagnostic Activities.

	Examined	Pos.	Cli.	Rel.	Total	% SS	% Pos.
Team & Disp. Resurveys	136,548	81	2	8	91	0.06	0.05
Pent. Prophylaxis and Examination Special Groups.	21,965	1	-	-	1	0.004	0.004
Voluntary Cases		19	4	14	37		
Total No.Cases Diagnosed		101	6	22	129		

The foci along R.Maijuju and R.Zungur in Bula and Zungur Districts could be considered quiescent. The recording of further positive cases in these areas even after prophylactic measures suggest that transmission, though at very low level, has not been completely interrupted.

There has been an increase in prevalence of the disease in Lame and Yamaltu Districts. During the survey of Lame District in 1962, 24 positive cases were diagnosed in 51,416 population examined, whereas in 1966, 10 positive cases were detected amongst 13,237 persons examined. Yamaltu District in 1965 had 2 positive cases in 9,794 person examined, but from the same area 9 positive cases were detected in 1966 amongst the population of 4,805. These two Districts require close watching.

The increase in percentage of total Sleeping Sickness cases in Duguri District is merely due to more relapsed cases diagnosed in the single village area of Gigyara; the positive cases are steadily decreasing; the Gigyara focus is apparently quiescent. The graph on page 28 is self explanatory.

The "Misau - Dingaiya focus" in Yarima District is still active, characteristically persistent in the same village areas of Gugulen, Dotori, Kalala, Dala and Zundi. These villages were surveyed in July 1966, when 20 positive cases were detected amongst 5,843 persons examined. A further survey of omitted villages of the same District was conducted in December when only 6 positive cases were found amongst the remaining population of 18,800.

Team Resurveys:

Division	District	Clan	No. Examined	Pos.	Cli.	Rel.	Total	% SS	% Pos.
Tiv	Ukum	<u>Icha</u>	6,208	1	-	-	1	0.01	0.01
"	Mbaikyor	<u>Ikov</u>	8,088	3	-	1	4	0.04	0.03
"	Sese	<u>Ipav</u>	13,401	5	-	-	5	0.03	0.03
"	N.Atsen	<u>Mbatlav</u>	21,954	20	-	1	21	0.09	0.09
"	Mbaikyor	<u>Nanev</u>	22,631	4	-	-	4	0.01	0.01
"	Ukum	<u>Ngenev</u>	17,982	1	-	-	1	0.005	0.005
"	Ukum	<u>Tongov</u>	13,562	6	-	-	6	0.04	0.04
"	Mbaikyor	<u>Turan</u>	21,223	25	3	-	28	0.13	0.11
"	Logo	<u>Torov</u>	8,750	1	-	-	1	0.01	0.01
"	Masev	<u>Yonov</u>	22,628	49	-	-	49	0.21	0.21
Wukari	<u>Donga</u>	(Suntai)	9,112	18	-	-	18	0.19	0.19
"	<u>Kato Bagha</u>		7,938	3	3	-	6	0.07	0.03
"	<u>Kinda Kuvyo</u>		1,357	-	-	-	Nil	0.00	0.00
"	Kucio		3,139	3	1	-	4	0.12	0.09
			177,973	139	7	2	148	0.08	0.07

Dispensary Resurveys:

Division	District	Hosp./ Disp.	No. Examined	Pos.	Cli.	Rel.	Total	% SS	% Pos.
Idoma	<u>Oturkpo</u>	<u>Otur.G.Hosp</u>	27,533	4	-	-	4	0.01	0.01
"	<u>Agatu</u>	Bagaji Disp.	12,394	8	1	-	9	0.07	0.06
Lafia	<u>Lafia</u>	<u>Lafia Disp.</u>	6,961	-	-	-	Nil	0.00	0.00
"	<u>Awe</u>	<u>Awe Disp.</u>	3,187	-	-	-	Nil	0.00	0.00
Nasarawa	<u>Afo</u>	<u>Udegi B.D.</u>	14,973	5	1	-	6	0.04	0.03
"	<u>Gitata</u>	<u>Gitata D.</u>	244	1	-	-	1	0.40	0.40
Tiv	Nongov	<u>Abinsi D.</u>	4,050	-	-	-	Nil	0.00	0.00
"	Masev	<u>Igbor Disp.</u>	10,329	52	5	2	59	0.57	0.50
"	Shitire	<u>K.Ala Disp.</u>	4,660	5	1	-	6	0.12	0.10
"	Mbaikyor	<u>Shangev D.</u>	36,904	29	1	1	31	0.08	0.07
Wukari	<u>Suntai</u>	<u>Donga Disp.</u>	7,507	12	3	2	17	0.22	0.15
"	<u>K.Kuvyo</u>	<u>Bantaji D.</u>	513	1	-	-	1	0.19	0.19
"	"	<u>Ibi Disp.</u>	8,738	-	-	-	Nil	0.00	0.00
"	(Likam)	<u>Takum Disp.</u>	10,803	17	-	1	18	0.16	0.15
			148,796	134	12	6	152	0.10	0.08

BENUE PROVINCE (Contd.)

Examination (only) of Groups considered more "At Risk".

Division Area	District Group.	No. Examined	Pos. in spite of Prophyls	Pos. not under Prophyls	Cli.	Total	% Pos.	No. Given Pent.
Nasarawa	<u>Afo</u> Mine Lab. & Fam's.	6,255	-	3	1	4	0.04	-

Voluntary Cases:

Division	District	Disp./Hosp/TC.	Pos.	Cli.	Rel.	Total
Idoma	<u>Oturkpo</u>	<u>Oturkpo G.Hosp.</u>	12	-	-	12
"	<u>Agatu</u>	<u>Bagaji Disp.</u>	5	5	5	15
Lafia	<u>Lafia</u>	<u>Lafia Disp.</u>	8	12	2	22
"	<u>Awe</u>	<u>Awe Disp.</u>	2	1	-	3
"	<u>Keana</u>	<u>Keana Disp.</u>	-	1	-	1
Nasarawa	<u>Afo</u>	<u>Udegi Beki D.</u>	3	-	-	3
"	<u>Gitata</u>	<u>Gitata Disp.</u>	3	-	-	3
Tiv	<u>Nongov</u>	<u>Abinsi Disp.</u>	3	-	4	7
"	<u>Masev</u>	<u>Igbor Disp.</u>	27	1	4	32
"	<u>Shitire</u>	<u>K.Ala Disp.</u>	8	9	7	24
"	<u>N.Atsen</u>	<u>Gboko Disp.</u>	27	3	8	38
"	<u>Sese</u>	<u>Mkar Chr.Hosp.</u>	9	2	-	11
"	<u>Jecira</u>	<u>Mbaakon SUM D.</u>	3	-	-	3
"	<u>Makurdi</u>	<u>Makurdi G.Hosp.</u>	7	-	3	10
Wukari	<u>Wukari</u>	<u>Wukari G.Hosp.</u>	5	13	3	21
"	<u>Likam</u>	<u>Takum Chr.Hosp.</u>	15	2	14	31
"	"	<u>Takum Disp.</u>	10	1	5	16
"	<u>K.Kuvyo</u>	<u>Bantaji Disp.</u>	4	2	-	6
"	"	<u>Ibi Disp.</u>	4	2	1	7
"	<u>Suntai</u>	<u>Donga Disp.</u>	7	5	4	16
Tiv	<u>Mbaikyor</u>	<u>Shangev S.D.</u>	30	9	12	51
			192	68	72	332

BENUE PROVINCE (Contd.)

Summary of Diagnostic Activities:

	No. Examined	Pos.	Cli.	Rel.	Total	% SS	% Pos.
Team and Disp. Resurveys	326,769	273	19	8	300	0.09	0.08
Examination Spec. Groups	6,255	3	-	-	3	0.04	0.04
Voluntary Cases		192	68	72	332		
Total No.Cases Diagnosed		468	87	80	635		

As usual, the greatest proportion of cases was detected in Tiv Division. The identification and localization of any conspicuous, persistent focus is not so easy here for various reasons: (a) extreme instability of the population, due in turn to the peculiar structure of Tiv society which favours dispersion and expansion; (b) difficulty of approach to scattered units of population for want of adequate road network; (c) shifting cultivation; (d) very poor attendances during surveys; (e) the transitional type of vegetation found South of the Benue which often results in all types of fly-habitats and man-fly contact situations being possible within even very limited areas.

Keeping in mind the above considerations, some "focal areas" rather than "foci" can be recognized to exist at the present locations of Yonov and Mbatlav Clans around Gboko Township, mostly in connection with the tributaries of R.Mu.

The difficulty in the exact identification of any durable focus, together with the high mobility of the population and constant arising of new situations of man-fly contact, suggest great caution in any planning and carrying out of vector-control measures in Tiv Division.

Detection of most of the cases in Yonov and Mbatlav Districts along the tributaries of R.Mu which were repeatedly resprayed in the past, confirms these views.

The well defined focus in Turan along the Tributaries of R.K.Ala shall require further attention.

Team Resurveys:

Division	District	No. Examined	Pos.	Cli.	Rel.	Total	% SS	% Pos.
Bedde	<u>Bedde</u>	10,065	4	1	-	5	0.04	0.03
Bornu	<u>Geidam</u>	17,514	-	-	-	Nil	0.00	0.00
Biu	<u>West Bura</u> (Sakwa)	3,936	2	-	-	2	0.05	0.05
"	<u>Shani</u>	4,564	4	1	-	5	0.10	0.08
"	<u>Kwaya Tera</u>	10,007	1	-	-	1	0.009	0.009
		46,086	11	2	-	13	0.02	0.02

Dispensary Resurveys:

Division	District/Disp.	No. Examined	Pos.	Cli.	Rel.	Total	% SS	% Pos.
Biu	<u>Biu</u> - Biu Disp.	2,520	1	-	-	1	0.03	0.03
"	<u>E. Bura</u> - T.Alade Disp.	299	-	-	-	Nil	0.00	0.00
		2,819	1	-	-	1	0.03	0.03

Voluntary Cases:

Division	District/Disp./Hosp./TC.	Pos.	Cli.	Rel.	Total
Biu	<u>Biu</u> - Biu Disp.	2	-	-	2
"	<u>E.Bura</u> Kwajaffa Disp.	1	-	-	1
"	" Tishan Alade Disp.	4	-	-	4
		7	-	-	7

Summary of Diagnostic Activities.

	No. Examined	Pos.	Cli.	Rel.	Total	% SS	% Pos.
Team & Disps.Resur's	48,905	12	2	-	14	0.02	0.02
Voluntary Cases		7	-	-	7		
Total No.Cases Diagnosed		19	2	-	21		

In Bedde Emirate, the focus South of the Katagum River, is much reduced and has shifted from Gorgoram V.A. downstream to Zabudum V.A. It is remarkable how this focus has never been completely extinguished in spite of all control measures adopted since its "rediscovery" in 1962, and how it has been mostly limited to the areas South of the Rivers Hadejia and Katagum. Both rivers are included within major Vector-Control Schemes by the Sleeping Sickness Service and Ministry of Animal and Forest Resources.

Geidam District which is within the Hadejia River Project Area has apparently been free from infection since 1945.

In Biu Emirate there has been the usual response to treatment and the high prevalence detected in 1963 is reduced to a reasonable level. Out of the 15 positive cases diagnosed this year, 14 are from the vector controlled area, the only one outside being recorded in Kwaya Tera, where a Survey continues. This Survey and that of Askira, which is due in 1967, shall define the boundary of this focus.

In conclusion, most of Bornu Province seems to be free from human trypanosomiasis, with the exception of Bedde and Biu Emirates, where it seems to be limited to well localized foci along the lower course of the R. Katagum in Bedde, and, in a more diffuse pattern, along some tributaries of the R. Hawal in the Biu Emirate.

Team Resurveys:

Division	<u>District</u>	No. Examined	Pos.	Cli.	Rel.	Total	% SS	% Pos.
Lafiagi-Pategi	<u>Lafiagi</u>	698	-	-	-	Nil	0.00	0.00
"	<u>Pategi</u>	126	-	-	-	Nil	0.00	0.00
		824				Nil	0.00	0.00

Dispensary Resurveys:

Division	<u>District</u>	Disp/Hosp.	No. Examined	Pos.	Cli.	Total	% SS	% Pos.
Borgu	Wawa	Kainji H.	17,665	-	-	Nil	0.00	0.00

Voluntary Cases:

None reported.

Summary of Diagnostic Activities.

No case detected out of 18,489 individuals examined.

In Lafiagi District 6 positive cases were detected in 1963 and 9 positive cases in 1964, when 9191 and 6643 persons were examined respectively. In Pategi District 6 positive cases were diagnosed in 1963 amongst the population of 15,379. No case was found during 1966 resurvey of the selected Village Areas of these two Districts.

More importance was paid to the examination of new labourers seeking employment with the Kainji Dam Authority and those attending the O.P. Department at New Bussa Hospital, to avoid entry of the parasite to this new Project Area.

Team Resurveys:

Division	District	No. Examined	Pos.	Cli.	Rel.	Total	% SS	% Pos.
Kwarra	Kupa (Abuji)	1,893	4	-	-	4	0.21	0.21

Voluntary Cases:

One "Relapse" reported at the time of the survey of Kupa.

The Kupa (Abuji) District was last surveyed in 1963 - 1964 when 11 positive cases were diagnosed out of 3,715 individuals examined, (0.32% pos.). Detection of 4 positive cases during the re-survey in 1966 warrants further attention to this District along with the neighbouring area.

Team Resurveys:

Division	District	No. Examined	Pos.	Cli.	Rel.	Total	% SS	% Pos.
Kano	<u>Dutse</u>	23,434	-	-	-	Nil	0.00	0.00
"	<u>Gwaram</u>	27,366	-	-	-	Nil	0.00	0.00
"	<u>Kiru</u>	48,102	2	-	-	2	0.004	0.004
"	<u>Kura</u>	106,943	11	2	-	13	0.01	0.01
"	<u>Rano</u>	65,067	5	-	-	5	0.007	0.007
"	<u>Tudun Wada</u>	38,388	5	-	2	7	0.01	0.01
		309,300	23	2	2	27	0.008	0.007

Dispensary Resurveys:

Division	District	Disp/Hosp.	No. Examin.	Pos.	Cli.	Rel.	Total	% SS	% Pos.
Kano	<u>Kura</u>	G.Babba	4,006	-	-	-	Nil	0.00	0.00
Hadeja	<u>Hadeja</u>	Hadeja GH.	26,384	1	-	-	1	0.003	0.003
"	<u>K.Hausa</u>	K.Hausa	20,168	-	-	-	Nil	0.00	0.00
"	<u>Kirikasamma</u>	Madaci	51,984	-	-	-	Nil	0.00	0.00
			102,542	1	-	-	1	0.009	0.009

Voluntary Cases:

Division	District	Disp./Hosp./TC.	Pos.	Cli.	Rel.	Total
Kano	<u>Kano</u>	Kano SSS Disp.	2	-	-	2
"	<u>Kura</u>	G.Babba TC.	2	3	-	5
"	<u>Gaya</u>	Hamdullahi Disp.	-	2	-	2
Hadeja	<u>Ringim</u>	Taura Disp.	-	-	2	2
			4	5	2	11

Summary of Diagnostic Activities.

	No. Examined	Pos.	Cli.	Rel.	Total	% SS	% Pos.
Team & Disps. Resurv's	411,842	24	2	2	28	0.006	0.005
Voluntary Cases		4	5	2	11		
Total No.Cases Diagnosed		28	7	4	39		

The situation in Kiru and Rano Districts was under control. A new focus in Kura District was detected. Most of the cases were from Gamadan Village Area (8 GP positive cases), which is situated on the South bank of R.Chalawa a few miles away from the limits of the controlled Kogin Kano area.

The appearance of new foci in Kiru, Rano and Kura Districts outside the Kogin Kano controlled area suggests that the intensive control measures carried out in the past, were actually pushing outwards the risk of infection from the controlled area to the neighbouring areas where no disease was formerly prevalent. This may be due to migration of flies as a result of "behaviour resistance" of the flies to insecticides. This phenomenon is not new to Entomologists, and obviously has to be taken into consideration when control measures are planned for large areas. (See Report on Tsetse Control in Kano Province).

With the Hadeja River Valley Project nearing its completion in 1967, it would be necessary to carry out over-all evaluation of human trypanosomiasis. All activities aiming at easy detection in this area should not only be continued, but should be made more efficient, and any odd case if detected should not be taken lightly, or easily dismissed as due to importation.

Taking into consideration the small number of positive cases detected amongst the large sample of population examined in 1966 (prevalence rate as 5.8 per 100,00) one can conclude that the Sleeping Sickness situation in Kano Province is well under control.

Team Resurveys:

Division	District	No.	Pos.	Cli.	Rel.	Total	% SS	% Pos.
		Examined						
Katsina	<u>Kankara</u>	22,452	10	-	-	10	0.04	0.04
"	<u>Musawa</u>	33,248	4	1	-	5	0.01	0.01
		55,700	14	1	-	15	0.02	0.02

Dispensary Resurveys:

Division	District	Disp./TC.	No.	Pos.	Cli.	Rel.	Total	% SS	% Pos.
			Examined						
Katsina	<u>Kankara</u>	Gundawa TC.	2,550	6	-	-	6	0.23	0.23
"	<u>Danja</u>	Bakori Disp.	28,959	-	-	-	Nil	0.00	0.00
			31,509	6	-	-	6	0.01	0.01

Voluntary Cases:

Division	District	Dispensary	Pos.	Cli.	Rel.	Total
Katsina	<u>Danja</u>	Bakori Disp.	3	-	-	3

Summary of Diagnostic Activities.

	No.	Pos.	Cli.	Rel.	Total	% SS	% Pos.
	Examined						
Team & Disps. Resurveys	87,209	20	1	-	21	0.02	0.02
Voluntary Cases		3	-	-	3		
Total No.Cases Diagnosed		23	1	-	24		

Previous Survey Reports:

	<u>YEAR</u>						<u>PATIENTS EXAMINED</u>	
Kankara District -	1963	- 17	+ve	Detected	out	of	10,536	"
	1965	- 37	+ve	"	"	"	36,735	"
Musawa District -	1962	- 25	+ve	"	"	"	32,136	"
	1964	- 2	+ve	"	"	"	12,377	"
	1966	- 4	+ve	"	"	"	33,248	"

The main focus in Kankara District has its centre in Pantaika in the Wawarkaza village area, along a small tributary of R.Turami; the one in Musawa District is in Zuri V.A. further down-stream along R.Turami. These hamlets and V.As were found to have the highest detectable prevalence as far back as 1938, and at all successive resurveys. This identity and persistence in location, irrespective of population changes, repeated surveys and repeated vector-control measures (extensive clearings), cannot be superficially explained by "improper maintenance" of the clearings and "re-introduction" of infection, which each time would have met conditions favourable to an "outbreak". These factors can be accepted up to a point, but do not give a fully satisfactory reason for such "outbreaks" within the same spots, without spread to nearby areas where equally all circumstances favourable do exist.

Team Resurveys:

Division	District	No. Examined	Pos.	Cli.	Rel.	Total	% SS	% Pos.
Bida	<u>Agaie</u>	4,139	1	-	-	1	0.02	0.02
"	<u>Bida Town</u>	810	-	-	-	Nil	0.00	0.00
"	<u>Katcha</u>	10,254	11	-	-	11	0.10	0.10
"	<u>Kede</u>	5,615	-	-	-	Nil	0.00	0.00
"	<u>Kutigi</u>	2,924	15	-	-	15	0.51	0.51
"	<u>Lemu</u>	29,695	17	3	3	23	0.07	0.05
Kontagora	<u>Auna</u>	1,593	-	1	-	1	0.06	0.00
Minna	<u>Gawu</u>	3,892	1	1	-	2	0.05	0.02
"	<u>Maikonkele</u>	3,656	-	-	-	Nil	0.00	0.00
		62,578	45	5	3	53	0.08	0.07

Dispensary Resurveys:

Division	District	Disp.	No. Examined	Pos.	Cli.	Rel.	Total	% SS	% Pos.
Minna	<u>Kuta</u>	<u>Kuta Disp.</u>	3,532	2	-	-	2	0.05	0.05
Abuja	<u>Abuja</u>	<u>Abuja Disp.</u>	10,366	-	-	-	Nil	0.00	0.00
			13,898	2	-	-	2	0.01	0.01

Examination (only) of Groups considered more 'At Risk'.

Division /Area	District / Group.	Exam- ined	Pos. in spite of Prophyxs.	Pos. not under Prophyxs.	Total Pos.	% Pos.	No. Given Pent.
Bida	<u>Bida-Mokwa</u>						
Bida-Mokwa	Road Labs.	599	-	-	Nil	0.00	-

Voluntary Cases:

Division	District	Disp./Hosp./TC.	Pos.	Cli.	Rel.	Total
Abuja	<u>Abuja</u>	<u>Abuja Disp.</u>	2	8	2	12
Bida	<u>Bida</u>	<u>Bida G.Hosp.</u>	2	12	3	17
"	<u>Jima Doko</u>	<u>Jima Doko Disp.</u>	7	7	2	16
Minna	<u>Minna</u>	<u>Minna G.Hosp.</u>	13	1	4	18
"	<u>Kuta</u>	<u>Kuta Disp.</u>	6	-	3	9
			30	28	14	72

Summary of Diagnostic Activities.

	No. Examined	Pos.	Cli.	Rel.	Total	% SS	% Pos.
Team & Disps. Resurveys	76,476	47	5	3	55	0.07	0.06
Examination Spec. Groups	599	-	-	-	Nil	0.00	0.00
Voluntary Cases		30	28	14	72		
Total No. Cases Diagnosed		77	33	17	127		

Remarks.

Previous surveys of Bida Township had never succeeded in obtaining attendances of more than 53% (1963). With the persistence of a fly-man contact situation within the Town due to flies breeding within the compounds and along the rivers crossing the Town, it was decided that a propaganda Campaign be organised in May 1966.

A preliminary fact-finding visit to the Native Authority and Township by the Sleeping Sickness Medical Officer disclosed the causes of failure of the Sleeping Sickness Service in raising the interest of the Bida people in its activities were:

- (a) Improper timing of surveys. Most of the Bida townmen are farmers. Cultivation of two or more crops a year gives them a very limited period of leisure, and if the survey is not planned during this short period of rest at the end of May and the beginning of June, then the attendance is poor.
- (b) The unfortunate drug reaction which occurred, with several deaths, more than two decades ago in Agaie, is still remembered by the elders of the Community who discourage co-operation.
- (c) For reasons unknown the disease in this part of the country is clinically mild in nature, and the people seem to be much less concerned. They are of the opinion that cervical adenopathy, locally known as "Kpatsungi", is better treated by their native operation of excision and scarification. (See photographs on page 54.)

Ministries other than that of Health, such as of Information and Agriculture, also took an active part in the Health Education of the Bida Townmen. Speeches by various Officers of the Sleeping Sickness Service, the Etsu Nupe and Native Administration resulted in a better attendance during the random sample of 22 different compounds conducted immediately after the campaign. No case was detected in a total of 810 persons examined. This satisfactory situation is mainly due to continuous fly control measures carried out in and around Bida town over the past few years.

The findings of Team surveys in Katcha and Kutigi Districts confirm the endemic belt along the Northern bank of River Niger in the vicinity of Rivers Gboko and Kaduna in that area. Here too, most of the cases detected are mild and asymptomatic which may be the main reason for lack of concern amongst the population and poor attendance during the surveys.

Team Resurveys:

Division	District	No. Examined	Pos.	Cli.	Rel.	Total	% SS	% Pos.
Akwanga	<u>Wamba</u>	20,027	65	8	5	78	0.38	0.32
Jos	<u>Amo</u>	3,603	1	-	-	1	0.02	0.02
"	<u>Batchit</u>	1,154	4	-	1	5	0.43	0.43
"	<u>Jere</u>	8,525	1	-	-	1	0.01	0.01
"	<u>Kwall</u>	6,528	-	-	-	Nil	0.00	0.00
"	<u>Miango</u>	10,876	-	-	-	Nil	0.00	0.00
"	<u>Rukuba</u>	10,491	1	-	3	4	0.03	0.009
Lowland	<u>Bwall</u>	2,200	23	-	2	25	1.13	1.04
"	<u>Chip</u>	3,146	1	-	-	1	0.03	0.03
"	<u>Doka</u>	5,394	6	-	-	6	0.11	0.11
"	<u>Kwolla</u>	13,254	-	-	-	Nil	0.00	0.00
"	<u>Mirriam</u>	3,160	131	1	2	134	4.24	4.14
Pankshin	<u>Jepal</u>	2,435	28	3	2	33	1.35	1.14
"	<u>Kamwai</u>	1,690	1	-	-	1	0.06	0.06
"	<u>Koffyer Ka</u>	8,076	40	-	-	40	0.49	0.49
"	<u>Richa</u>	2,297	-	-	-	Nil	0.00	0.00
"	<u>Tof</u>	2,486	-	-	-	Nil	0.00	0.00
		105,342	302	12	15	329	0.31	0.28

Dispensary Resurveys:

Division	District	Disp/Hosp/ TC.	No. Examined.	Pos.	Cli.	Rel.	Total	% SS	% Pos.
Akwanga	<u>Eggon</u>	N.Eggon D.	2,106	1	-	-	1	0.04	0.04
"	<u>Mada</u>	Anadaha D.	2,538	1	-	1	2	0.08	0.04
Jos	<u>Batchit</u>	<u>H.Kibo TC.</u>	1,154	12	-	1	13	1.04	1.03
"	<u>Rukuba</u>	Zagum Disp.	2,698	1	-	-	1	0.03	0.03
Lowland	<u>Dimmuk</u>	Dimmuk TC.	6,459	3	-	-	3	0.04	0.04
"	<u>Doka</u>	Dokan Kas D.	3,681	6	-	-	6	0.16	0.16
"	<u>Shendam</u>	Shendam G.H.	7,380	1	-	-	1	0.01	0.01
			26,016	25	-	2	27	0.10	0.09

Examination & Pentamidine Prophylaxis (or Examination only)
of Groups considered more "At Risk".

Division /Area	District /Group	No. Exam- ined.	Pos. in spite of Prophyxs.	Pos. not under Prophyxs.	Total Pos.	% Pos.	No. Given Pent.
Akwanga	<u>Mada</u>	982	-	-	Nil	0.00	911
<u>Andaha</u>	Mine Lab. & Fam's.						
"	PWD Lab. & Fam's.	137	-	-	Nil	0.00	-
Akwanga	<u>Eggon</u>						
<u>N.Eggon</u>	Mine Lab. & Fam's.	297	-	-	Nil	0.00	251
"	PWD Lab. & Fam's.	42	-	-	Nil	0.00	-
Akwanga	<u>Wamba, Mama.</u>						
Gwong- gowon	Mine Lab. & Fam's.	3,014	1	-	1	0.03	2,219
<u>Wamba</u>	Mine Lab. & Fam's	1,767	-	-	Nil	0.00	1,464
"	PWD Lab. & Fam's.	149	-	-	Nil	0.00	-
		6,388	1	-	1	0.01	4,845

Voluntary Cases:

Division	District	Disp./Hosp./TC.	Pos.	Cli.	Rel.	Total
Akwanga	<u>Eggon</u>	Mass.Eggon Disp.	3	-	2	5
"	<u>Mada</u>	Andaha Disp.	5	5	5	15
"	<u>Wamba</u>	GwonGwon Disp.	2	1	2	5
"	<u>Wamba</u>	Wamba SSS Disp.	2	2	5	9
Jos	<u>Batchit</u>	Hawan Kibo.TC.	8	3	-	11
"	<u>Rukuba</u>	Zagum Disp.	2	7	8	15
Lowland	<u>Dimmuk</u>	Dimmuk TC.	7	-	4	11
"	<u>Doka</u>	Dokan Kasuwa Disp.	16	1	7	24
"	<u>M.Kwang</u>	Mirriam Kwang TC.	110	3	2	115
"	<u>Shendam</u>	Shendam G.Hosp.	7	1	10	18
			162	23	45	230

PLATEAU PROVINCE (Contd.)

Summary of Diagnostic Activities.

	No. Examined	Pos.	Cli.	Rel.	Total	% SS	% Pos.
Team & Disps. Resurveys	131,358	327	12	17	356	0.27	0.24
Spec. Groups Exams. (incl. Pent. Proph.)	6,388	1	-	-	1	0.01	0.01
Voluntary Cases		162	23	45	230		
Total No.Cases Diagnosed		490	35	62	587		

There was an outbreak of Sleeping Sickness in the two adjacent Divisions of Lowland and Pankshin in the Province during the year under review. 361 positive cases were detected (surveys and voluntary) out of a total of 388 recorded cases in Ewall, Doka, Dimmuk and Mirriam Kwang Districts of Lowland Division, and Jepal and Koffyer Kwa Districts of Pankshin Division. The majority of these cases (241 positive out of a total of 249) were from Mirriam Kwang alone. The area between the rivers Dep and Shemankar has been known as an endemic focus for the past thirty years, and clues to this outbreak have been noticed for the last two to three years. The highest levels of prevalence are observed in exactly the same village areas known from the records as consistently most affected.

In Wamba District the scattered foci along the Wamba - Jos road have continued to produce detectable infection of a mild type. Past records confirm their existence in more or less the same locations for more than 30 years. Other foci are scattered around the tributaries of R.Farin Ruwa in Mama Sub-district.

The Hawan Kibo focus in Batchit is persistently active. The same population of 1,154 was submitted to Team and Dispensary Resurveys when a further 24 positive cases (including voluntary) were detected. The area has been sprayed in 1966 and it is hoped that future resurveys would indicate the achievements of control measures.

7.8.11

SOKOTO PROVINCE.

Team Resurveys: = Nil

Dispensary Resurveys: = Nil

Voluntary Cases: = Nil

Summary of Diagnostic Activities = Nil.

It is assumed that there is no human trypanosomiasis in Sokoto Province, though in the past as far back as 1954, Illo, Tillu and Kaoje area on the south of the River Niger had shown cases. There is need of a resurvey in this area.

7.8.12

SARDAUNA PROVINCE.

Team Resurveys:

Division	<u>District</u>	No.	Pos.	Cli.	Rel.	Total	% SS	% Pos.
		Examined						
Southern	<u>Sugu</u>	3,516	-	-	-	Nil	0.00	0.00

Dispensary Resurveys: = Nil

Voluntary Cases: = Nil.

7.8.13

ZARIA PROVINCE.Team Resurveys:

Division	District	No. Examined	Pos.	Cli.	Rel.	Total	% SS	% Pos.
Zaria	<u>Igabi</u>	11,004	-	-	-	Nil	0.00	0.00
"	<u>Kajuru</u>	5,649	-	-	-	Nil	0.00	0.00
"	<u>Kauru</u>	9,728	4	-	-	4	0.04	0.04
"	<u>Kubau</u>	17,802	-	-	-	Nil	0.00	0.00
"	<u>Lere</u>	14,540	-	-	-	Nil	0.00	0.00
"	<u>Soba</u>	14,221	10	-	-	10	0.07	0.07
"	<u>Zongon Katab</u>	12,973	-	-	-	Nil	0.00	0.00
		85,917	14	-	-	14	0.01	0.01

Dispensary Resurveys:

Division	District	Disp/Hosp.	No. Examin.	Pos.	Cli.	Rel.	Total	% SS	% Pos.
Zaria	<u>Kauru</u>	<u>Geshere</u>	3,198	7	2	-	9	0.28	0.21
Jema'a	<u>Jema'a</u>	<u>Kafanchan Gen.Hosp.</u>	18,709	6	-	1	7	0.03	0.03
"	"	O. Jema'a	1,602	1	-	-	1	0.06	0.06
"	"	<u>S. Gida</u>	3,937	15	1	-	16	0.40	0.37
			27,446	29	3	1	33	0.12	0.10

Examination and Pentamidine Prophylaxis (or Examination only)
of Groups considered more "At Risk".

Division Area	District Group	No. Examin.	Pos. in spite of Prophy.	Pos.not under Prophy.	Total	% Pos.	Given Pent.
Jema'a	Jema'a						
<u>Abu</u>	Mine Lab.& Fam.	1,752	-	-	Nil	0.00	1,426
"	PWD Lab. & Fam.	23	-	-	Nil	0.00	-
<u>F.Wate</u>	Mine Lab.& Fam.	364	-	-	Nil	0.00	304
O.Jema'a	Mine Lab.& Fam.	3,347	-	-	Nil	0.00	2,638
"	PWD Lab. & Fam.	226	-	-	Nil	0.00	-
"	Timber Lab.	275	-	-	Nil	0.00	-
<u>S. Gida</u>	PWD Lab. & Fam.	209	-	1	1	0.47	-
"	Timber Lab.	46	-	-	Nil	0.00	-
<u>S. Zawan</u>	Resettlement	1,889	-	1	1	0.05	1,859
		8,131	-	2	2	0.02	6,227

ZARIA PROVINCE (Contd.)

Voluntary Cases:

Division	<u>District</u>	Disp./Hosp.TC.	Pos.	Cli.	Rel.	Total
Jema'a	<u>Jema'a</u>	Fadan Wate Disp.	4	1	-	5
"	"	Old Jema'a "	8	-	1	9
"	"	Sabon Gida "	14	4	11	29
"	<u>Kagoro</u>	Kafanchan G.Hosp.	5	3	9	17
Zaria	<u>Lere</u>	Lere Disp.	6	8	7	21
"	"	Warsa/Mariri TCs.	6	1	10	17
"	<u>Kauru</u>	Geshere Disp.	7	5	4	16
			50	22	42	114

Summary of Diagnostic Activities.

	No. Examined	Pos.	Cli.	Rel.	Total	% SS	% Pos.
Team & Disps. Resurveys	113,363	43	3	1	47	0.04	0.03
Special Groups Exams.	8,131	2	-	-	2	0.02	0.02
Voluntary Cases		50	22	42	114		
Total No.Cases Diagnosed		95	25	43	163		

Remarks:

A selective survey in all the Districts crossed by River Kaduna and Galma, including all population units within a strip approximately 5 miles broad on each bank, showed the sharp limits of the endemic area in Kauru and Z.Katab Districts; again an eloquent example of "non-spread".

The finding of 10 Positive Cases in Soba, along the Southern bank of R.Galma around Turawa V.A. at the end of 1966, was rather unexpected. The limits of this focus shall be better appreciated as the survey continues.

The "Piti Focus" is apparently quiescent. The last positive cases are found further downstream mostly along R.Kurami. It is to be noted that a detectable prevalence has shifted to the more western area of Lere District as a consequence of migration of population to the more fertile farmland along the Rivers Kurami and Mariri.

It has already been pointed out earlier, under the general review, that study of recorded cases at this focus over the past few years shows a progressive fall in the Positive/Negative Ratio which has now reached below 1.0. (There were only 26 positive cases amongst a total of 63 cases recorded during 1966). The persistency of negative diagnosis, and the development of a real addition to periodical treatment among the community served by the various treatment centres in the area call for attention.



12-13. Sleeping Sickness; diagnosis (top) - gland puncture,
and treatment.



14-15. Sleeping Sickness;
Native "doctor"
performing opera-
tion of excision and
Scarification of
gland (top), and
patients.



Voluntary Cases Treated at Dispensaries and Hospitals.

Province	A-1 Treated at Dispensaries			A-2 Treated at Hospitals			A-3 Total Cases Treated at Disps.& Hosps.			
	Pos.	Cli.	Rel.	Pos.	Cli.	Rel.	Pos.	Cli.	Rel.	Total
Adamawa	-	2	7	2	2	1	2	4	8	14
Bauchi	10	2	4	9	2	10	19	4	14	37
Benue	144	48	55	48	20	17	192	68	72	332
Bornu	7	-	-	-	-	-	7	-	-	7
Ilorin	-	-	-	-	-	-	-	-	-	Nil
Kabba	-	-	1	-	-	-	-	-	1	1
Kano	4	5	2	-	-	-	4	5	2	11
Katsina	3	-	-	-	-	-	3	-	-	3
Niger	15	15	7	15	13	7	30	28	14	72
Plateau	155	22	35	7	1	10	162	23	45	230
Sardauna	-	-	-	-	-	-	-	-	-	Nil
Sokoto	-	-	-	-	-	-	-	-	-	Nil
Zaria	45	19	33	5	3	9	50	22	42	114
	383	113	144	86	41	54	469	154	198	821

Ratio Pos./Neg. 383/257

Ratio Pos./Neg. 86/95

Ratio Pos./Neg. 469/352

APPENDIX B-1: Team Resurveys, by Province.

Province	No. Examined	Pos.	Cli.	Rel.	Total	% SS	% pos.
Adamawa	44,265	12	2	5	19	0.04	0.02
Bauchi	133,381	78	2	8	88	0.06	0.05
Benue	177,973	139	7	2	148	0.08	0.07
Bornu	46,086	11	2	-	13	0.02	0.02
Ilorin	824	-	-	-	Nil	0.00	0.00
Kabba	1,893	4	-	-	4	0.11	0.11
Kano	309,300	23	2	2	27	0.008	0.007
Katsina	55,700	14	1	-	15	0.026	0.025
Niger	62,578	45	5	3	53	0.08	0.07
Plateau	105,342	302	12	15	329	0.31	0.28
Sardauna	5,809	-	-	-	Nil	0.00	0.00
Sokoto	Nil						
Zaria	85,917	14	-	-	14	0.01	0.01
	1,029,068	642	33	35	710	0.06	0.05

APPENDIX B-2: Dispensary Resurveys, by Province.

Province	No. Examined	Pos.	Cli.	Rel.	Total	% SS	% Pos.
Adamawa	Nil						
Bauchi	3,167	3	-	-	3	0.09	0.09
Benue	148,796	134	12	6	152	0.10	0.08
Bornu	2,819	1	-	-	1	0.03	0.03
Ilorin	17,665	-	-	-	Nil	0.00	0.00
Kabba	Nil						
Kano	102,542	1	-	-	1	0.009	0.009
Katsina	31,509	6	-	-	6	0.01	0.01
Niger	13,898	2	-	-	2	0.01	0.01
Plateau	26,016	25	-	2	27	0.10	0.09
Sardauna	Nil						
Sokoto	Nil						
Zaria	27,446	29	3	1	33	0.12	0.10
	373,858	201	15	9	225	0.06	0.05

APPENDIX B-3: Combined Data for Team and Dispensary Resurveys, by Province.

Province	No. Examined	Pos.	Cli.	Rel.	Total	% SS	% Pos.
Adamawa	44,265	12	2	5	19	0.04	0.02
Bauchi	136,548	81	2	8	91	0.06	0.05
Benue	326,769	273	19	8	300	0.09	0.08
Bornu	48,905	12	2	-	14	0.027	0.024
Ilorin	18,489	-	-	-	Nil	0.00	0.00
Kabba	1,893	4	-	-	4	0.11	0.11
Kano	411,842	24	2	2	28	0.006	0.005
Katsina	87,209	20	1	-	21	0.024	0.022
Niger	76,476	47	5	3	55	0.07	0.06
Plateau	131,358	327	12	17	356	0.27	0.24
Sardauna	3,516	-	-	-	Nil	0.00	0.00
Sokoto	Nil						
Zaria	113,363	43	3	1	47	0.04	0.03
	1,400,633	843	48	44	935	0.06	0.05

APPENDIX C.

Provincial Distribution of Cases, by Diagnosis.

Province	Positive	Clinical	Relapsed	Total	Ratio Pos./Neg. + +
Adamawa	14	6	13	33	14/18
Bauchi	101	6	22	129	101/28
Benue	468	87	80	635	468/167
Bornu	19	2	-	21	19/2
Ilorin	-	-	-	Nil	
Kabba	4	-	1	5	4/1
Kano	28	7	4	39	28/11
Katsina	23	1	-	24	23/1
Niger	77	33	17	127	77/50
Plateau	490	35	62	587	490/97
Sardauna	-	-	-	Nil	
Sokoto	No Diagnostic Activities				
Zaria	95	25	43	163	95/68
All Prov.	1,319	202	242	1,763	1,319/444

+ Note: "Negative" refers to Cases in which no Parasites could
+ be detected, namely "Clinical" + "Relapsed".
+

Examination & Prophylaxis of Groups at Special Risk, by Category and Province.

Category	Province	Examined only	Examined & given Pentamid.	Total No. Examined	Positive before starting Prophylax	Positive after starting Prophylax	Total No. Positive	% Pos. whole group.
Mine Labourers and Families	Bauchi	19,778	202	19,980	1	-	1	0.005
	Benue	6,255	-	6,255	3	-	3	0.04
	Plateau	1,215	4,845	6,060	-	1	1	0.01
	Zaria	1,095	4,368	5,463	-	-	Nil	0.00
		28,343	9,415	37,758	4	1	5	0.01
Railway Extention & Road Labourers	Bauchi	-	1,985	1,985	-	-	Nil	0.00
	Niger	599	-	599	-	-	Nil	0.00
		599	1,985	2,584	-	-	Nil	0.00
PWD Labourers & Families	Plateau	328	-	328	-	-	Nil	0.00
	Zaria	458	-	458	1	-	1	0.21
		786	-	786	1	-	1	0.12
Timber Extract. Labs.	Zaria	321	-	321	-	-	Nil	0.00
Resettlement (S.Gida)	Zaria	-	1,859	1,859	1	-	1	0.05
All Categories & All Groups.	Bauchi	19,778	2,187	21,965	1	-	1	0.004
	Benue	6,255	-	6,255	3	-	3	0.04
	Niger	599	-	599	-	-	Nil	0.00
	Plateau	1,543	4,845	6,388	-	1	1	0.01
	Zaria	1,874	6,227	8,101	2	-	2	0.02
		30,049	13,259	43,308	6	1	7	0.01

APPENDIX E.

Provincial Distribution of all Cases of Sleeping Sickness.

Province:	<u>Resurveys</u>		Mines, etc.	<u>Voluntary</u>		Total	% of
	Team :	Disp.	Exams.	Disp. :	Hosp.	Cases	Total
Adamawa	19	-	-	9	5	33	1.8
Bauchi	88	3	1	16	21	129	7.3
Benue	148	152	3	247	85	635	35.9
Bornu	13	1	-	7	-	21	1.1
Ilorin	-	-	-	-	-	Nil	0.00
Kabba	4	-	-	1	-	5	0.2
Kano	27	1	-	11	-	39	2.2
Katsina	15	6	-	3	-	24	1.3
Niger	53	2	-	37	35	127	7.1
Plateau	329	27	1	212	18	587	33.2
Sardauna	-	-	-	-	-	Nil	0.0
Sokoto	No Diagnostic Activities						
Zaria	14	33	2	97	17	163	9.2
All Prov.	710	225	7	640	181	1,763	100.0

APPENDIX F.

Summary: Diagnostic Classification of Cases
Detected at All Type of Mass Examinations.

Type of Exam.	No. Examined	Pos.	Cli.	Rel.	Total	% SS	% Pos.	% Neg.
Team Resurveys	1,029,068	642	33	35	710	0.06	0.05	
Disp. "	373,858	201	15	9	225	0.06	0.05	
Spec. Group Exams.	43,308	7	-	-	7	0.01	0.01	
	1,446,234	850	48	44	942	0.065	0.058	0.006

8. Tsetse Control Activities for 1966.
(Mr. T.A. Yuwa Ag. P.C.O.)

8.1 During the latter half of the year, the Tsetse Control Section of the Ministry of Health was left with only one Entomologist - Dr. A.R. Mir. Mr. D.A. Turner, Entomologist, was seconded under the U.K. Technical Assistance Scheme, left for the United Kingdom in July 1966. Dr. A.R. Mir who was mainly assigned to the Hadejia River Valley Project also toured other Sleeping Sickness Service Units to advise on the control measures to be adopted in those areas.

Almost all of the technical staff in the Tsetse Control Section of the Sleeping Sickness Service are of Northern Nigeria origin and hence this section did not experience the shortage of staff as other departments of the Ministry of Health had to face. All the control programmes were carried out according to plan except in some operational areas of the Gboko Unit where fly surveys were delayed due to disturbed political conditions prevailing.

During 1966 the Section had the following control staff:-

- 2, Senior Control Officers;
- 9, Control Officers;
- 7, Assistant Control Officers;
- 3, Senior T.C. Inspectors;
- 11, T.C. Inspectors;
- 61, T.C.As. I, II, III;
- 10, T.C.As. (in training) and
- 24, Subordinate Staff.

The control officers who were in the United States of America studying Entomology, as mentioned in the 1965 Report, continued their studies in that country. One of them is due to return after graduation in Entomology next year.

No major control extension scheme was commenced this year - but intensive preliminary survey work was carried out for new control projects in areas of high endemicity of Sleeping Sickness. Tsetse control activities of the various Units were restricted to maintenance of fly free zones in their areas, either by spraying or through reslashing. The account of their activities in brief, is as follows:-

8.2 Bauchi Province.

Bauchi town was kept fly free by the usual annual reslashing and stumping of the barriers created in the environs of the town.

In Yamaltu District, the forest reserve at Kanuwa was found to be re-invaded after spraying. Thinning of mangoes and guava plantations were carried out in the months of May and June 1966, and since then the forest reserve has been fly free.

The entire Ningi control scheme was checked during the year to determine the effectiveness of the insecticide used. So far the results have shown complete eradication of G.tachinoides in the scheme; however, G.morsitan are still being caught in that area. In Bula and Zungur Districts, G.tachinoides was reported to be present in some isolated pockets: these pockets were sprayed after the pruning of mango trees. No flies have since been seen at these places up to the time of writing this Report.

8.3 Benue Province.

The measures taken in the past to eradicate the flies in Tiv Division of Benue Province by spraying the river banks and maintenance of barriers proved a failure and Tsetse were still found in the areas of operation. The main rivers, where the control measures were carried out, are R.Konshisha, R.Ambighir and R.Mu.

R.Mu which was sprayed once had to be resprayed as a result of re-invasion, and yet the flies could not be eliminated. It became evident that the flies were breeding not only at the river banks but also inside compounds, and specially where pigs were kept.

The control staff of the Gboko Unit which was supplemented by staff from other Units carried out intensive surveys of the area to plot the actual breeding places of the flies in the area.

This information was gathered for a pilot project to be launched in 1967 when compounds would also be sprayed along with the vegetation.

8.4 Kano Province.

Most of the staff of the Kano Unit were engaged in the Hadejia River Valley Project. An account of this project, by Dr. A.R. Mir, the Government Entomologist, is included elsewhere in this Report.

In January, 1966, attention of this Unit was drawn to the fact that sporadic cases of Sleeping Sickness were occurring

in Kogin Kano and the K.K.Z. areas which were fly free in the past. Intensive fly checks were carried out to determine the extent of the re-invasion and to study the feasibility of linking various control schemes to eliminate chances of re-invasion in the future.

8.5 Katsina Province.

42 cases of Sleeping Sickness were reported in Kankara District of Katsina Emirate in 1965. As a result of this a detailed fly and vegetation survey of R.Turame and its tributaries was conducted to determine the control measures to be adopted in the affected area.

8.6 Niger Province.

The measures taken in the previous years of ensuring that Bida town is Tsetse free were continued. Barriers totalling to 4 miles of Rivers were made around the Town, and 60 miles of riverine vegetation were sprayed with 4% suspension of Dieldrin 20% E.C. in the environs of the Township.

8.7 Plateau Province.

Due to the out-break of Sleeping Sickness in Hawan-kibo, in the previous year, spraying of the endemic areas was commenced in January 1966. All riverine vegetation of the infected areas were sprayed-out with 2½% Emulsion prepared from 20% Dieldrin E.C., while 4% Emulsion was used in spraying the river barriers.

At Mirrian Doka District, where S.S. cases were reported early in the year, fly and vegetation surveys were conducted to determine the control measures to be adopted for that area.

8.8 Zaria Province.

The annual maintenance of the Kano-Katsina-Zaria barriers was carried out in 1966: 8 out of 17 barriers were reslashed. As a result of re-invasion of flies in the controlled R.Maryaji and its tributaries, a total of 67 miles were re-sprayed with 4% Emulsion prepared from 20% Dieldrin E.C.

Outside the KKZ area, 124 miles of Riverine vegetation on the banks of R.Sulma and its tributaries were resprayed with 5% DDT/WP. made from 75% W.P.C. These rivers were first sprayed in 1959 for experiment when insecticide was introduced for the control of Tsetse flies. Re-invasion was recently reported on these rivers.

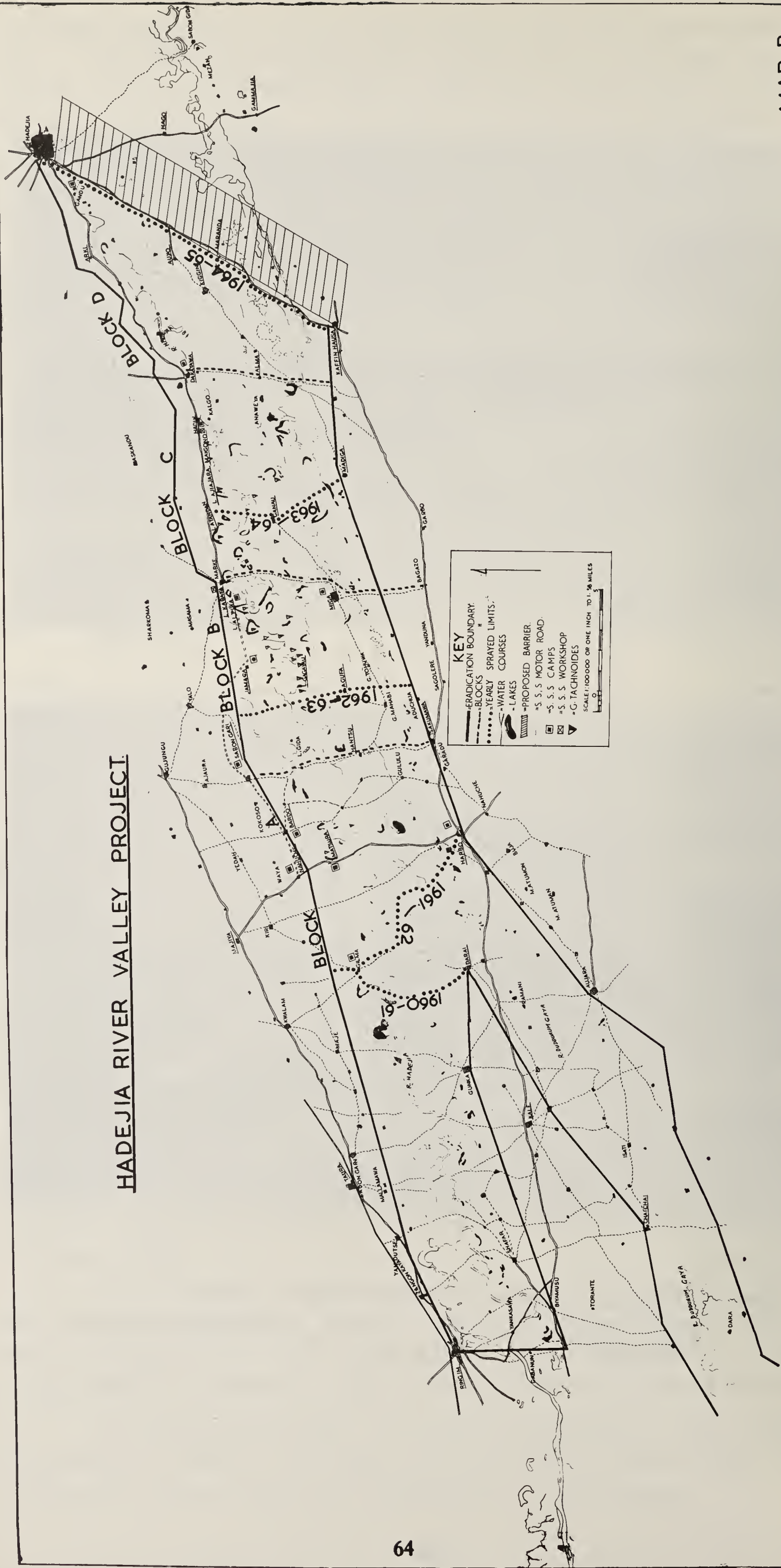
At Pitti area in Lere District which was resprayed in 1964 for the third time, re-invasion was again reported. The control team carried out a thorough survey to determine the measures to be adopted to achieve complete eradication of flies in the area.

In the Kaduna area, the annual reslashing of the vegetation within a radius of 5 miles of the Township was carried out to keep the flies away from the Capital of the Region.



16-17. Sleeping Sickness Service Offices, Kano.
Top, original office; bottom, new office, opened
May 1965.

HADEJIA RIVER VALLEY PROJECT.



9. Eradication of Glossina tachinoides from Hadejia
River Valley - Northern Nigeria.

by

Dr. A.R. MIR.

Entomologist Sleeping Sickness Service (*)

The success of small scale experiments with insecticides in Kano Province encouraged the undertaking of the eradication of G.tachinoides from Duddurun Gaya valley, which was successfully accomplished between 1958 and 1962. G.tachinoides were eradicated from the sources right up to the confluence of Duddurun Gaya with river Hadejia. The eradication of tsetse from this river system was essential for the successful completion of Hadejia river valley project. It was the only source from where re-invasion of the controlled Hadejia valley could have taken place.

The preliminary survey of Hadejia river system started in Wudil in November 1957, and except for adverse weather conditions continued without break until June 1959, and covered the valley as far as the western boundary of Hadejia Emirate. The information gathered formed the basis of the plans formulated to eradicate tsetse from the entire valley.

The 1960 - 61 dry season saw the start of spraying in the Hadejia valley from a line drawn between Ringim and Gabarun. It continued throughout the 1961-62 dry season without the assistance of any external aid. During this season (1961-62) 42 square miles were sprayed using a maximum of 70 knapsac pressure sprayers. 14 tons of D.D.T. 75% wettable powder were used. Multiple courses of river and the extensive tracts of Mimosa asperata (Kaidaji) considerably slowed down the progress of the work.

In June 1962, an agreement was concluded between the Government of Northern Nigeria and the Government of United States of America for assistance in the scheme to eradicate tsetse fly from as great a part of the Hadejia valley as possible by 1967. US/AID agreed to supply D.D.T. wettable powder, spraying equipment, inspection vehicles (Jeeps, etc.), heavy vehicles (Trucks), Tractors with trailers and heavy bull-dozers. They also agreed to provide the services of one Entomologist, four Control Officers and one Agricultural Engineer. The Entomologist arrived in time to see the end of 1962-63 dry season and was able to undertake the supervision of advance survey of the valley east of Hadejia - Keffin Hausa road in the 1963-64 dry season. The four Control Officers were never recruited. The Engineer was available for short periods only.

(*) Paper prepared for publication in an Entomological Journal

Yearly objectives were laid out in a valley divided into four imaginary blocks (A - D). The target objective for the 1962-63 dry season was to eradicate fly from Block 'A'. It was hoped that by the end of 1965-66 dry season, fly would have been eradicated from Block 'D'. Hadejia-Kaffin Hausa road was recognised as the eastern limit of Block 'D'. A two mile wide barrier was to be established by ruthless bush clearance east of the Hadejia-Kaffin Hausa road. Hadejia-Dakayawa-Marke-Sabongari-Nahuche road was considered to be the northern boundary of the proposed project area. Kaffin Hausa - Harbo road appeared to be the southern limit. These limits were laid down on the basis of the ground surveys carried out since 1957. Fly and vegetation maps completed since 1957 showed the presence of G.morsitans in the valley. This lead to the inclusion of large islands of vegetation lying in the flood plain away from the water-courses in the proposed project by the original planners. Indiscriminate spraying using 5% D.D.T. suspension was to be practised. However, later investigations on the fly habitats revealed that the scope of work was not the same as envisaged by the original planners.

Progress of Work During the 1962-63 Dry Season.

None of the AID equipment arrived early enough to be used during the season. The work was carried out largely by the Northern Nigeria Government's own efforts. After a few days work before Christmas 1962 the spraying operations in Block 'A' started on 4th January, 1963. Presence of large clear areas on the eastern side of Nahuche-Harbo road, extensive farmlands on the northern side of Harbo-Tsakuwawa road and the southern side of the Nahuche-Sabongari foot path helped the spraying teams to cover large areas in a relatively short time and Block 'A' was finished before schedule, and work was extended into Block 'B' the area proposed for the 1963-64 dry season. Approximately 13.5% of Block 'B' was sprayed out before closing down the work on 17th April, 1963. A total of 20.5 tons of D.D.T. 75% wettable powder was used with 50 to 75 sprayers in action and approximately 79 square miles were covered by spraying operations.

Results of Entomological Studies.

Extensive stretches of medium to heavy vegetation (mostly Mitragyna africana) were present in the low lying areas between the multiple water courses. Clumps of Mimosa asperata (Kaidaji) were mostly found on the river bed and were also seen lining the inner fringes of the river banks. It was feared that clumps

of Mimosa as in some other parts of the country would greatly hinder the progress of the work as they were difficult to penetrate for spraying purposes and there was danger of leaving isolated foci of tsetse unsprayed with the consequent reinvasion of the sprayed areas during the following rainy season. Most of the fears were unfounded. Fly catchers succeeded in penetrating the clumps for considerable distances through narrow paths and standing catches of 3 to 4 hours duration were maintained in many places with negative results. Most of the Mimosa clumps were in high flood areas and remained partly submerged under water for considerable periods. Obviously fly could not breed on top of the Mimosa asperata (Kaidaji) branches. Possibility of fly breeding in the Mimosa clumps was ruled out. Mitragyna africana (Giyayya) vegetation was such that G.tachinoides as well as G.morsitans could exist in it provided the other conditions were suitable. In the flood plains of the valley Mitragyna africana (Giyayya) tree trunks showed flood marks up to 5 feet high. In the dry season the soil gradually dried up, but was hardened and cracked. It was hardly a suitable place for the fly to breed. Thorough checks by maintaining standing catches proved the complete absence of fly. No wonder not a single fly was caught during the spraying operations of 1960-61 and 1961-62 dry seasons. In Block 'A' G.tachinoides were found at two spots only. Western bank of lake Matsura was one of them. It was observed that the bank was on high ground where flood water either did not reach or stayed for short periods only. Vegetation was heavy and consisted of Syzygium guineense (Malmo), Mitragyna africana (Giyayya), Diospyros (Kanya), Dichrostachys nutans (Sarkakiya), and creepers. At first it was considered to be a dry season concentration area where the fly had retreated with the receding water and the drying up of the vegetation in the surrounding areas. It is known when the tsetse retreat some of them are likely to be left in pockets of vegetation which might provide them with suitable micro-climates. Hence, it was argued, the necessity of spraying all the vegetation indiscriminately. To ascertain the validity of this view thorough fly checks were maintained on all the green spots in the valley. The places most likely to harbour fly in the extreme hot and dry conditions which prevailed during the dry season were the permanent pools and lakes with suitable vegetation around them. And many such places existed in the midst of the vast low lying area west of the Nahuche-Harbo road but no fly was ever caught. The only other spot where G.tachinoides (one only) was caught in

Block 'A' was on the bank of an unnamed river east of Nahuche-Harbo road. The river had fairly high banks with heavy vegetation. The idea that fly were not widespread but confined to isolated suitable habitats only was gaining strength.

Blocks 'B' and 'C'.

A fairly high concentration of G.tachinoides were found on the banks of many lakes around Marke. It was possible to catch 20 to 30 flies in a period of four hours by a team of 4 men.

The fly population of one lake was separated from the other, a conclusion reached at after making searches in the vegetation separating two lakes. For instance, the vegetation between lake Shina and lake Ajjajara was continuous. Flies were caught on the banks of both lakes but none could be caught on the vegetation between the two.

As a result of the standing catches maintained to a distance of 800 yards from the fly infested banks of lakes Atandan, Shina, Ajjajara and Madigawa it was concluded that although green and heavy vegetation continued away from the banks, flies could never be caught beyond 300 yards from the nearest source of water.

In the case of lake Atandan, searches were made to a distance of one mile away from its northern bank. It was situated about 50 to 300 yards south of Marke-Dakayawa tract and was heavily infested with fly. In the month of March vegetation on its northern bank was green and heavy and extended right up to the Marke-Dakayawa tract, but immediately across it, it changed into a woodland which was completely dry. The fly were found right up to the tract but their complete absence immediately across it confirmed the view that in the dry season they were strictly confined to their permanent habitats only. Actually the results were the same when the area was surveyed in July 1963, during the rainy season.

The woodland north of Mark-Dakayawa road could provide a habitat for G.morsitans. Standing checks were maintained during different seasons of the year up to a distance of three miles north of the road but no G.morsitans was ever seen or caught. It was further confirmed by the periodic fly checks carried out throughout the following four years up to the end of June 1967.

The above mentioned observations confirmed the view that fly were not widespread; they were confined to the riverine vegetation only, and showed a definite preference for the high banks of lakes which provided them with suitable habitats throughout the year.

Fly surveys revealed that the real fly belt laid on the northern side of the project area extending from lake Gagayau in Block 'B' to village Hadin in Block 'C'. Vegetation around lakes with fly was very heavy. Whereas River Hadejia itself had only light to medium vegetation. The vegetation between river Hadejia and the northern boundary of the project area was very heavy. Tributaries of river Hadejia flowing in the middle of the valley and their lakes were found to be fly free except in Block 'C' where G.tachinoides were caught on lake Rufau only. River Basagi (southern-most channel) running through Blocks 'B' and 'C' had very light vegetation, mostly Mimosa asperate (Kaidaji) and Chakachaka confined to the banks only. No fly was caught on it. The area between river Basagi and Harbo-Kaffin Hausa road (which was the southern limit of the project area) was found to be extensively cultivated and was eventually excluded from the project work plan.

Block 'D' was traversed by two rivers only. River Hadejia running on the southern side of Hadejia-Dakayawa road had light vegetation of Mimosa asperate (Kaidaji) and Chakachaka confined to its banks only. On the southern side river Basagi was naturally clear with patches of light to medium vegetation (Mimosa asperate and Diospyros). The area between it and the Kaffin Hausa-Harbo road was extensively cultivated. There was extensive cultivation of land around the villages and on the banks of the two rivers. In the rest of the valley, enclosed between the northern and southern channels of Block 'D', the vegetation was scattered through the fadama. It could not provide a suitable habitat for Glossina. In the absence of fly and suitable vegetation on the rivers flowing through this block, the 'proposed barrier' and the area beyond it, there was no need to include it in the spraying scheme. Deviating from the traditional policy of blanket spraying, insecticide was applied to the riverine vegetation only.

Barrier. According to the original work-plan it was proposed to make a two mile wide ruthless barrier on the eastern side of the Hadejia-Kaffin Hausa road. A detailed survey of the barrier revealed that no further clearing was required to make it effective. Scattered light vegetation consisted of Acacia albida (Gawo) and Mitragyna africana (Giyayya). Farmlands were extensive. River Hadejia, passing through the barrier near Hadejia town and beyond was naturally clear. The only other water course passing through it was river Basagi which was also naturally clear. A few permanent pools of water were present but no vegetation around them. An aerial survey of the

barrier revealed that similar conditions prevailed far beyond the area covered by ground surveys. Hence, there was no danger of re-invasion from the east. It seemed to be an obvious conclusion that the proposed barrier and block 'D' should together form an effective barrier to any possible re-invasion. With the exclusion of block 'D' and the 'natural barrier' from the proposed spraying and clearing scheme, the work on the project was cut down by at least one year. The area east of the proposed barrier was further investigated as part of the advance survey work, and will be discussed under the heading 'Advance Survey'. But it would be quite appropriate to mention here that the absence of fly and lack of vegetation over a large area east of the proposed barrier confirmed the view that there was no danger of re-invasion of the sprayed blocks west of the Hadejia-Kaffin Hausa road.

It was obvious that application of insecticide to the permanent habitats only could have eradicated fly from the entire valley. Recommendations were made to abandon the policy of blanket spraying and adopt more selective techniques, to restrict spraying to a width of 300 yards on the banks of lakes and rivers only, to exclude river Basagi and block 'D' from the project area, and to regard the proposed barrier as effective without undertaking ruthless clearing of the vegetation. The Ministry of Health gradually became more selective in choosing areas to be sprayed.

Results of the fly surveys carried out during the months of November and December 1963, showed that during the preceding rainy season no re-invasion had taken place west of the sprayed line in Block 'B', but one male G.tachinoides was caught on 15th November, 1963 at the west bank of lake Matsura in Block 'A'. Despite our best efforts no more flies could be caught but two pupal cases were found, indicating that breeding had been taking place on the high banks of the lake. Checks carried out at suitable habitats in the vicinity of lake Matsura yielded no catches. Re-appearance of fly at lake Matsura had caused us great concern because of its serious implications. Although the vegetation surrounding the lake had been resprayed, it never altered the fact that G.tachinoides had survived there during the wet season of 1963, and had every chance to spread out to all the possible habitats thus rendering the whole of Block 'A' as a non fly-free zone. But the fact that G.tachinoides due to the peculiar conditions prevalent in the valley were restricted to the permanent habitats only, proved to be a blessing, and subsequent checks in Block 'A' showed the complete absence of fly.

Re-appearance of fly could be due to one of the following reasons. The solitary male caught could have followed a fisherman, a hunter or an animal from a distant infested area. The lake was a favourite spot for fishing. The possibility of re-invasion was very remote as the nearest source of fly was around Marke area. If re-invasion of lake Matsura had taken place it should have been possible to find a fly somewhere in between the source of re-invasion and the eastern rivers of Block 'A', unless it was assumed that it took a long jump from the surroundings of Marke and decided to land at exactly the same spot where it had been known to exist, and deliberately avoided settling down anywhere in between. The fact that fly had been found at exactly the same and the only spot where it had been known to exist before lake Matsura was sprayed out, indicated the possibility of the presence of D.D.T. resistant strains of G.tachinoides. The fly could have retreated to the high banks of the lake (an ideal permanent habitat) from an outlying pocket during the wet season to escape their destruction from floods. It was a very likely explanation, but one could not think of any possible fly habitat in the surrounding area which had not been sprayed. The last, and the most likely reason, could be the ineffectiveness of the D.D.T. used in this area. It had been received from an old stock. It had been tested and found to be less than 75% in strength and was used as a 50% wettable powder. It was very dirty and difficult to mix. Perhaps it had deteriorated to the extent of being ineffective.

1963 - 64 Dry Season.

Objectives for the season were to complete eradication of G.tachinoides from Block 'B' and as great a part of Block 'C' as might be possible; to survey that part of the Hadejia valley that lies between Hadejia and Gashua, study the tsetse habitats and distribution, and formulate plans for eradication of Glossina.

US/AID personnel and equipment which had started arriving during the preceding rainy season were put into action.

Spraying in Block 'B' started on December 16th, 1963 and continued in Block 'C' up to 25th April 1964, when the work was closed down. Approximately 50% of fly vegetation in Block 'C' was covered. 43 tons of D.D.T. 75% W.P. was consumed, and approximately 102 square miles of area was covered. Approximately sixty to ninety sprayers were put into action.

Surveys were repeated in Blocks 'B', 'C' and 'D' to verify the results of surveys conducted during the 1962-63 dry season, and to investigate whether any recessions or advances in fly population had taken place. Further observations were made on the habitats preferred by Tsetse. Thorough searches were made to confirm the absence of G.morsitans. About three miles west of Hadejia town and 300 to 700 yards north of Hadejia-Dakayawa road there was a stretch of heavy vegetation extending for about three miles. It was checked during the 1962-63 dry season and immediately before and after the following wet season. Despite the presence of suitable habitats, G.morsitans were found to be absent. Repeated fly surveys confirmed that the area north of Hadejia-Dakayawa-Marke road was fly free and there was no danger of re-invasion from that side. Surveys confirmed that Block 'D' was in fact fly free. Views expressed about the proposed barrier were also confirmed.

Investigations established the view that G.tachinoides in this valley were confined to the high ground habitats due to the flooded conditions of the surrounding low lying areas. In the wet season their distribution was most restricted and localised; wet season habitats were in fact their concentration areas. Generally speaking, the tsetse fly are supposed to disperse (in the case of G.tachinoides up to a distance of 3 miles or more) in the wet season. The wet season habitats are referred to as 'temporary habitats', as opposed to the dry season habitats which are supposed to be 'permanent habitats' which are also known as concentration areas. Just the opposite was true in the case of this valley. Contrary to common practice, the term 'permanent habitat' was applicable to the wet season habitats, and the dispersal, if any, took place in the dry season only when the breeding sites followed the receding water. In other words, fly had no chance of spreading out of its isolated foci because of the flooded conditions in the wet season, and the extremely hot and unfavourable conditions in the dry season. Hence the view was held that the isolated foci were not a threat to the whole valley. Control measures directed at the isolated foci would have resulted in the eradication of fly from the entire valley. No re-invasion of the sprayed area had taken place during the 1963 wet season. No significant recessions or advances of fly population were observed. It strengthened the view that G.tachinoides were not fond of changing their habitats unless forced by severe climatic conditions, and each focus deserved to be treated as a localised problem.

D.D.T. 75% W.P.

Two hundred tons of D.D.T. water-dispersable powder supplied by US/AID, though not deteriorated in strength, was coarse, difficult to mix, and tended to settle down very quickly. It resulted in the frequent blockage of sprayer nozzles and triggers. Two ounces of a domestic detergent, costing 6d, proved to be sufficient to facilitate the mixing of 14 lbs of D.D.T. in 20 gallons of water in less than ten minutes.

Hudson Sprayers.

US/AID supplied the project with 100 'Hudson' Sprayers. The nozzles were good and produced a fine spray. But constant difficulties were experienced with their pumps and triggers. The rubber washers wore out easily (within two weeks), and constantly fell into the pump barrel. As the triggers could not be opened the inevitable blockade, whenever it occurred, could not be removed easily. Many of the Hudson sprayers supplied by US/AID were modified by replacing their triggers with those of the "Mysto's". But the trouble due to the wearing out of the rubber washers continued. Towards the end of the dry season (1963-64), Mr. Stewart, Agricultural Engineer of US/AID, succeeded in modifying the Hudson sprayers which had been put out of action because of the trouble in pumping mechanism. A simple tube-valve, from a car's rubber inner-tube, was inserted and sealed on top of the sprayer, and air pressure put into the tank with a foot pump. Towards the end of the final spraying season (1964-65), two portable motor-driven air compressors were introduced which replaced nearly half of the total number of foot pumps. As a result of this innovation a large number of condemned sprayers (Hudson and Mysto) were put to use in the 1964-65 dry season. The modification not only helped us to overcome the difficulties arising out of the acute shortage of sprayers, but also speeded up the spraying operations. Nevertheless the simple tube valve, the ordinary foot pump and the portable motor-driven air compressors had troubles and shortcomings of their own. It is not a sort of innovation which could be recommended as a permanent solution for any future large scale spraying operations.

D.D.T. Mixing Tank.

Before the 1964-65 dry season spraying commenced, Mr. Stewart, Agricultural Engineer of US/AID, introduced hand-operated mixing tanks, but unfortunately due to the frequent clogging of the residual D.D.T. at the exit tap, it was found to be impracticable. It was hardly used for more than a fortnight before the team leaders reverted to the old method of mixing.

With some improvements it might prove to be a useful device in the future, but it did not contribute towards the speeding up of the spraying operations in Hadejia River Valley Project. It did not eliminate the necessity of using detergents to facilitate the mixing of D.D.T.

Hago High Ground Experiment.

The experiment was started with a view to verify the theory about the primary and secondary habitats of fly in Hadejia River Valley. It was assumed that the G.tachinoides returned to the high grounds (primary habitats) during the wet season to save itself from destruction when the low lying places (secondary habitats) became gradually submerged under rising flood waters, and by spraying the wet season concentration areas the fly could be eradicated from the entire valley. In the Hago village area flies were caught in the dry season in the low lying areas near water, but a permanent habitat was never far off. As the water receded to the river bed the fly naturally spread out of its permanent habitats and came to live in the vegetation (including Mimosa) surrounding the water courses. With the approach of the rainy season it was forced to retreat to its permanent habitats at a considerable loss to its pupal life, which kept the rate of the growth of its population under check.

It was decided to verify these ideas on the fly habitats in Hadejia river valley by spraying the high grounds only in Hago village area towards the beginning of wet season. The experimental spraying was started on 25th May and ended on 18th June, 1964. Only the high grounds which were not likely to be submerged under flood water were sprayed. A 5% suspension of D.D.T. prepared from 75% D.D.T. W.P. was applied using 15 knapsac pressure sprayers. A total of 3,682 lbs of 75% D.D.T. W.P. was used. A sum of £184: 6: 10d was spent on labour charges.

There were at least three light showers of rain while the spraying was going on, followed by a heavy downpour a week after the spraying ended. Very few flies were seen while spraying was going on. When fly checks were started on 14th July to evaluate the results of spraying, a large number of flies were seen and caught, indicating that with the rise in the level of flood water the flies started retreating from their secondary habitats to the primary habitats only to encounter their death. It confirmed the view that with the advent of the rainy season the fly must retreat to the high grounds (wet season concentration areas) to save itself from destruction. This view was further strengthened by the fact that during the peak of the dry

season, while it was possible to catch 5 flies per man hour in the low lying vegetation near the water courses, to detect any fly on top of the high grounds was extremely difficult.

Fly checks to evaluate the results of experimental spraying were started on 14th July, 1964, nearly four weeks after the spraying finished. During 14th to 25th July, a total of 15 G.tachinoides (4 males and 11 females) were caught. They included one teneral caught on 14th July at point 1. During the month of August 1964, 12 G.tachinoides (3 males and 9 females) were caught. They included 2 young flies caught on 3rd and 7th August. During the month of September, the flood water was at its highest peak and working conditions had become extremely difficult. Fly checks were resumed with the help of two portable boats and one male G.tachinoides was caught on point IV on the 18th. No fly was picked up during the month of October. In order to ensure that it was not harbouring any atypical habitats, extensive checks were carried out in and around the villages situated on the sand dune south of river Basagi. On November 13th the last two flies were caught - one male at point 1 and a female at point IV.

There was no difficulty in explaining the presence of a comparatively large number of flies on the sprayed high grounds during the months of July and August. According to the high ground theory one would expect to find the maximum number of flies coming to the high ground during the months of July and August, and probably towards the end of June also, when the rising flood water would force G.tachinoides to retreat to its wet season concentration areas (primary habitats).

Persistence of fly during the month of July could also be explained by the fact that any pupae which might have been present in the area towards the end of spraying could have hatched up to a period of three to six weeks in the climatic conditions prevailing in this part of the Sudan Savannah Zone - which explains the presence of one teneral caught on 14th July.

The appearance of two tenerals in August (one on 3rd August and another on 7th August) indicated that flies had been emerging for at least seven weeks from the last date of spraying. A pupation period of ten weeks or more is not unknown. And the young flies found in August could have emerged from pupae burrowed into soil before spraying started. Re-appearance of two tenerals in August and one male G.tachinoides in September could also be explained by assuming that flies reaching the high grounds during the months of July and August succeeded in giving birth to their larvae before coming in contact with D.D.T. But to have found two

flies as late as November 13th was not easy to explain. The very fact that the two flies caught were from points 1 and IV which had been established as the primary foci because of the large number of flies caught there during July and August, lead one to believe that some of the G.tachinoides had in fact survived the wet season on top of the high grounds. Persistence of fly despite thorough spraying was not without precedence. The situation was very much analogous to the case explained with regard to lake Matsura where fly had not only survived a very thorough spraying, but had been breeding during the following rainy season as indicated by the presence of two pupal cases. Fly rounds had been conducted all the year round on all the high grounds as well as the surrounding low lying area. Besides checking the typical habitats, all sorts of atypical habitats were checked including villages on the sand dune far off from the sprayed high grounds. The advance survey of the valley up to the confluence of the northern and southern channels of river Hadejia with river Katagum, showed the complete absence of fly. Therefore, it was extremely difficult to point out a possible source of re-invasion. If the flies had come from micro-climates found somewhere else in the valley, it implied that they had survived the peak of the high flood season, which was usually in September, in places other than the high grounds which had been sprayed. Having survived the peak of the high flood season in micro-climates, there was no need for them to emigrate to points 1 and IV from where water was already receding with the approach of dry season. Their natural movement should have been to follow the receding waters and would have ultimately come down to live in the low lying vegetation surrounding the water channels, and would have been detected because extensive and intensive fly checks were maintained on the low lying water channels. It was inconceivable that, after having survived the wet season somewhere else in the valley, it suddenly decided to migrate to points 1 and IV (previously known to be primary habitats) without settling down anywhere in between. In view of the above explanation it appeared very likely that the flies found on November 13th had managed to escape death either by avoiding contact with the insecticide or by proving to be a D.D.T. resistant strain. The possibility of D.D.T. having been washed away or diluted in strength due to the showers that were recorded during and immediately after the spraying operations, thus exposing the fly to a sub-lethal dose resulting in the emergence of a D.D.T. resistant strain cannot be ruled out.

1964 - 1965 Dry Season.

Spraying commenced on 5th January 1965, with 45 sprayers in action and finished on 28th April, 1965, all the spraying objectives having been achieved two years ahead of schedule. A total of 20.5 tons of D.D.T. wettable powder was consumed. The pace of the work in Blocks 'C' and 'D' was increased because stretches of heavy vegetation were comparatively fewer, farm-lands were extensive and there were large areas covered with scattered vegetation only. In such areas selective spraying was practised by spraying the shaded tree trunks only. Spraying in Block 'D' was mainly confined to the riverine vegetation. On the northern channel it was extended to a distance of one mile across the Hadejia-Dakayawa road; it was considered consistent with the policy of blanket spraying to spray it up to a distance of one mile across the road.

Fly surveys conducted during the months of November and December 1964, showed the complete absence of fly at lake Shina and other places which had been sprayed during the 1963-64 dry season. It indicated that no re-invasion had taken place during the preceding rainy season from the eastern side where flies had been known to exist on lake Ajajra and the river banks. It confirmed the observations made in the previous years that G.tachinoides in Hadejia river valley were confined to their ideal habitats and showed no tendency to migrate.

The water course north of Hadejia-Dakayawa road were considered as drainage line, because they filled up with water during the very high flood period only. They were lined with medium to heavy vegetation on their banks, and if other factors were favourable could become possible habitats of G.tachinoides. In view of the fact that no fly had ever been found in Block 'D' or on river Hadejia from Hadin to Hadejia town, and water did not stay for long in drainage lines, the likelihood of the presence of G.tachinoides was considered to be nil and no control measures were applied.

Fly surveys showed that in view of the geographical and climatic conditions prevalent in the valley, there was no possibility of fly harbouring in any atypical habitats north of the project area.

1965 - 1966 Dry Season.

All the sprayed blocks and Hago high grounds were repeatedly checked and found to be fly free. It is known that G.tachinoides are difficult to detect when found in low density

There were many ant hills situated on the high grounds. There was a possibility that some of them with vegetation around them were left unsprayed. There was one high ground in the vicinity of the fly belt which had not been sprayed because the vegetation on top of it was considered to be unimportant. There was a slight possibility that fly might have survived the wet season either on top of the ant hills or the high ground left unsprayed.

Leaves collected as late as 10 months after the last date of spraying were found to be with deposits of D.D.T. which was still active enough to kill house flies. The importance of D.D.T. deposits having been found as late as the end of April 1965, was considerably reduced by the fact that the leaves were not collected at random, they were picked out from underneath sheltered places as being leaves which had retained spray deposit.

Since 13th November, 1964, fly had never been found either on the sprayed high grounds or on the unsprayed vegetation (which previously harboured it in large numbers) in the low lying areas near the water courses. Extensive and intensive fly checks carried out up to the end of June 1967, in the typical as well as atypical habitats yielded negative results only, which implied that the experiment had been successful. It resulted in the exclusion of large areas from the project work plan which according to the techniques of blanket spraying might have involved one dry season's work. The experiment proved that in Hadejia river valley G.tachinoides were confined to their ideal habitats which happened to be the high banks of the permanent lakes and other high grounds in the vicinity of water. By directing control measures against the primary habitats only, it should have been possible to eradicate it from the entire valley. It was proved that the terms like 'concentration area' and 'dispersal area' as understood in common use were not applicable to this valley. Here the concentration area (primary habitats) meant the wet season habitats and the dispersal areas (secondary habitats) were actually the dry season habitats. The experiment proved that during the rainy season of 1964, when it rained up to 24 inches, under field conditions the D.D.T. was active enough for a sufficiently long period to kill off any flies that might have come in contact with it. It did not, however, imply that wet season spraying was feasible in other parts of the country, unless the predominant type of vegetation in the area intended to be brought under control belonged to species which did not shed their leaves for many months.

populations. Therefore, emphasis was laid on maintaining standing catches in all places previously known to harbour fly. River Komadugu Yobe was surveyed from Gashua to Geidam and despite the presence of possible fly habitats was found to be fly free.

1966 - 1967 Dry Season.

Intensive fly checks were maintained in the controlled area west of Hadejia-Keffin Hausa road and on the Hago high grounds to assess the results of insecticidal spraying. To confirm the results of the fly surveys conducted during the previous two dry seasons, fly checks were repeated on the northern and southern channels of river Hadejia up to their confluence with river Katagum. No fly was ever seen or caught. Having achieved all the objectives the project was completed on June 30th, 1967.

Advance Survey.

Possibility of eradicating tsetse from the proposed project area about two years ahead of the schedule had become obvious by the end of the 1962-63 dry season. It was, therefore, decided to survey the valley east of Hadejia-Keffin Hausa road as far as Gashua on the northern side and up to the confluence of its middle and southern channels with river Katagum, with the object of knowing the extent of fly distribution, the type of vegetation, and the geographical and climatic conditions effecting the fly's distribution. This survey was to form the basis of future planning for the eradication of fly from the valley east of Hadejia-Keffin Hausa road. The advance survey was started on 12th November 1963. With the exception of a few medium to heavy patches of vegetation, the banks of river Hadejia as far as its confluence with river Burum Gana were either naturally clear or lined with light clumps of Mimosa (Kaidaji). Farm lands were extensive. The northern channel continued as river Hadejia up to its confluence with river Katagum, where from it continued as Komadugu Yobe in the eastward direction; the southern channel was known as river Basagi up to its confluence. For a distance of about 12 miles east of Hadejia-Keffin Hausa road, it was either naturally clear or lined with patches of light Mimosa (Kaidaji) only. The vegetation on river Burum Gana was considered to be unsuitable to harbour any fly and the results of the surveys confirmed it. The above description of river Hadejia and river Basagi made it abundantly clear that the

'proposed barrier' together with a fly free block 'D' would form an effective barrier to any re-invasion from the eastern side.

Despite the presence of some excellent possible fly habitats on the northern channels (beyond the confluence of Burum Gana), no fly was ever caught or seen. The same was true of river Basagi beyond the Hago experimental area. The vast area lying between river Hadejia on the north and river Basagi on the south was mainly a flood plain with several islands of high ground which were either covered with thick forests or brought under cultivation.

The Veterinary Tsetse Unit found the river Komadugu Yobe as fly free, but decided to spray it up to Gashua. The results of their fly rounds from Gashua to Geidam were negative. They found, and eventually exterminated, a pocket of fly nearly fifteen miles north east of Geidam. With the extermination of G.tachinoides from this pocket, Hadejia/Komadugu Yobe river valley has been rendered free of fly right up to its border with the Niger Republic and lake Chad. The absence of fly was further confirmed when the Ministry of Health decided to resurvey river Komadugu Yobe from the confluence of rivers Katagum and Hadejia eastward up to Geidam during the 1965-66 dry season.

Conclusions.

With temperatures soaring up to 110°F., and a dry season lasting up to seven months, the multiple water courses separated by flood plains and islands of high ground were features which determined the extent of fly distribution and the density of its population in this valley. Because of the flooded conditions in the rainy season, and extremely hot climate in the dry season, G.tachinoides was confined to the ideal habitats on top of the high banks of permanent lakes and rivers. It was never found in an atypical habitat either inside the project area or north of it. The fly populations of various lakes in blocks 'A', 'B' and 'C' did not show any tendency to emigrate or mix with each other.

During the five years period only one case of the re-appearance of fly was recorded at lake Matsura in block 'A', and in the absence of any possible source of re-invasion, it was indeed difficult to explain. Emergence of a D.D.T. resistant strain of G.tachinoides was suspected at Hago high grounds where an opportunity to develop resistance by constant exposure to sub-lethal doses might have been provided because of the rains during and after the spraying operations.

By directing control measures against the primary habitats only, it would have been possible to eradicate it from the entire valley. But no risks were taken and most of the vegetation in the valley was sprayed with a 5% suspension of D.D.T. prepared from 75% D.D.T. wettable powder.

Hago high ground experiment further confirmed that by spraying the high grounds (primary habitats) only, towards the beginning of a rainy season, it was possible to eradicate G.tachinoides from a large area in the flood plains of the Sudan Savannah Zone.

A lot of time and energy was wasted on mixing D.D.T. which was coarse and tended to settle down very quickly and which caused frequent blockage of the triggers and nozzles of the sprayers. The addition of a small quantity of domestic detergent greatly facilitated the process of mixing.

Due to constant trouble in the pumping mechanism, most of the knapsack pressure sprayers (Hudson and Mysto) were modified by inserting a simple tube-valve on top of the sprayer tank, and a foot-pump or a portable motor-driven air compressor was used for pumping air pressure into it. This innovation was introduced at a time when there was danger of work coming to a halt due to the acute shortage of sprayers. It helped us to overcome a difficult period but did not offer a permanent solution of the problem which lay in acquiring new, sturdy and hard-duty sprayers like the "Coleibri".

A hand operated mixing tank was designed but could not be put to use because of the frequent clogging of the residual D.D.T. at the exit tap. Therefore, it did not make any contribution towards the speeding up of the spraying operations.

Objectives of the project were achieved two years ahead of schedule. The success of the Hago high ground experiment resulted in saving at least one dry season's work. It was considered unnecessary to make a two mile wide ruthless barrier east of Hadejia-Keffin Hausa road. In block 'D' spraying was confined mainly to the riverine vegetation. In block 'C' stretches of heavy vegetation were comparatively fewer and farmlands were extensive. The southern channels (river Basagi) were found to be either naturally cleared or lined with patches of light to medium vegetation. The result was an accelerated rate of progress. The co-operation extended to each other by the senior staff working on the site resulting in a co-ordinated and concerted effort, was exemplary. The junior staff working under very hazardous and strenuous conditions displayed a high sense of responsibility resulting in the maximum output of work.

G.morsitans could have disappeared due to the destruction of wild animal life (particularly warthog) or the alteration of its natural habitat by man. Neither of these phenomenon happened in this valley. Despite increased human activity there was enough vegetation suitable to harbour G.morsitans. Game was not scarce, and warthogs were often seen. Therefore, the complete disappearance of G.morsitans from the entire valley within a period of 3 to 4 years was difficult to explain.

Fly and vegetation surveys of the valley east of Hadejia-Keffin Hausa road extended over a period of four years and showed that, with the exception of Hago area, the valley was free of fly right up to Geidam. With the extermination of G.tachinoides from the north east of Geidam the entire valley right up to its border with lake Chad and the Niger Republic was rendered as fly free.

The controlled parts of the valley, from Ringim to Hadejia, had been under constant surveillance for periods ranging from three to seven years, which was considered to be a reasonable length of time to confirm the absence of fly. However, it was planned to continue with the periodic fly checks at the possible fly habitats for another couple of years.

While 67 Sleeping Sickness cases were treated at Hadejia Hospital in 1960, 37 S.S. cases in 1961 and 34 S.S. cases in 1962, there was no evidence of any new cases coming up for treatment.

Throughout the area brought under control, and the vast area surveyed east of Hadejia-Keffin Hausa road, the Fulani cattle were seen frequently. Fishermen were seen active on lakes and other suitable places on the main channels. Truck-loads of fish were seen transported to Kano from lake Matsura near Nahuche. Millet, Maize and Guinea corn were the main crops. Rice, sugarcane and cotton fields were not uncommon. During the last few years, the Irrigation Department of the Ministry of Agriculture have succeeded in growing wheat over a large area near Hadejia town. Tobacco plantations were also coming up. Thus there was a great potential for economic development. With the completion of Hadejia river valley project approximately 750 square miles of land have been cleared of the vector of human Trypanosomiasis. Its effects on the socio-economic life of people are already obvious with large tracts of land being cleared for farming and new settlements set up in places where tsetse was known to be a menace. The inhibiting effect of tsetse on the movements of people was removed. It is earnestly hoped that in the near future large scale agricultural schemes will be initiated aimed at the agricultural development of the area, as the extermination of Tsetse was only a first phase in the longer term development plans of the valley.



18. Hadejia River Valley Project.

Left to Right; Dr. J.D. Soley, C.M.O. (Prev.Service)
Ministry of Health, Northern Nigeria - Director of project;
Mr. C.J. Fredrickson, U.S.A.I.D. Entomologist; Dr. A.R. Mir,
S.S.S. Entomologist, during inspection tour.



19. H.R.V. Project Planning and Map Making.



20-21. H.R.V.P. Spraying operations.

10.1 During the year there were two teams operating on Simulium Control in the Region: one based on Gwoza in Sardauna Province, the other on Abuja in Niger Province.

Mr. K.F. Frazer, Entomologist, seconded under the U.K. Technical Aid Scheme was in charge of the Gwoza team until his retirement from the Service in May 1966. Since then it has been in the care of the Medical Officer in-charge of the Bama Medical Area under direction from the Principal Health Officer (Rural Health) Kaduna.

10.2 Abuja Team.

The work of the team during the year was a continuation of the insecticidal control of Simulium damnosum Theobald, vector of onchocerciasis in the Abuja and Lokoja areas, and also to assess the fly population in control areas and in Kaduna Capital Territory.

The Abuja control scheme was the follow-up of the previous work done in the area, entailed the treatment of the waters of the three main rivers with a D.D.T. emulsion mixture against the immature stages of S.damnsum. The water of these rivers was treated once a week for 12 weeks from May to July. Approximately 350 gallons of D.D.T. emulsion conc. were used. The effects of the control measures were assessed by larvae breeding surveys and fly rounds for adult flies.

The breeding surveys showed that breeding had been eliminated from the control rivers for about 2 months after treatment, but thereafter a gradual re-infestation began to occur; it was observed during routine breeding surveys that the uncontrolled Gurara River was the cause for re-infestation. Further breeding surveys have been advised before this river could be included for treatment with D.D.T.

Fly rounds were conducted from June until the end of December 1966, and were carried on concurrently with the larviciding until this was completed at the end of July. The results obtained indicated a much higher degree of control that was obtained in 1965. The results of the fly rounds in 1966 are summarized in the table overleaf and show comparisons between the pre-control year (1955) and with last year.

Month	1955 pre-control			1965 post-control			1966 post-control		
	Flies	Boy- hours	FBH.	Flies	Boy- hours	FBH.	Flies	Boy- hours	FBH.
June	139	42.25	3.3	12	215.00	0.055	7	208.00	0.033
July	300	36.25	8.3	29	303.75	0.095	18	143.25	0.130
August	830	52.00	16.0	183	320.25	0.510	93	251.25	0.370
September	624	37.25	16.8	139	274.75	0.503	108	222.50	0.458
October	211	24.75	8.5	73	300.00	0.240	17	233.50	0.072
November	112	38.75	2.9	5	248.75	0.020	12	236.50	0.050
December	25	21.00	1.2	3	287.75	0.010	0	185.25	0.000

Reference to the table shows that in 1966 a total of 255 flies were caught in a catching period of 1,480.25 boy-hours, giving a mean S.damnorum density of 0.173 FBH. between June and December. In the same period of the pre-control year 1955, a total of 2,241 flies was collected in 252.25 boy-hours giving a mean density of 8.884 FBH., therefore the fly density in 1966 was only about 2% of that before control. Hence a very satisfactory degree of control was achieved during 1966, and more than was achieved in 1965.

10.3 Lokoja control.

The Lokoja control scheme was conducted by a team from the Abuja Unit. Larviciding was proceeded with for a period of 3 months at the three treatment points as in previous years, where approximately 200 gallons of D.D.T. emulsion concentrate were used. Throughout the year Simulium breeding surveys were continued in the area.

10.4 Kaduna control.

The annual fly-rounds of the Capital Territory were maintained in 1966: the following is a summary of the catches made during the year as compared with 1965:-

<u>Year</u>	<u>Boy-hours</u>	<u>Flies</u>	<u>Flies per b/h.</u>
1965	185.0	71	0.38
1966	133.5	50	0.37

The fly density was so low that it was decided not to carry out any larviciding on the Kaduna River.

10.5 Simulium Surveys.

Investigations in the Gwoza Resettlement Scheme Area in Sardauna Province were commenced early in the year by Mr. K.F. Fraser, Entomologist, to obtain adequate, scientifically recorded baseline data on fly breeding and adult densities in that area throughout the year. Unfortunately Mr. Fraser proceeded on leave to the United Kingdom in May pending resignation from the Service. In the meantime until a replacement for the Entomologist arrives, Junior staff of the Abuja Simulium Control Unit, and Tsetse Control Unit, Bauchi, conducted surveys for Simulium breeding places in six rivers in Bornu and Adamawa Provinces. Breeding was found in some of these rivers and others were reported as likely to be breeding places during the period of heavy rains from the end of July.

10.6 W.H.O. Onchocerciasis Advisory Team.

Early in the year the W.H.O. sponsored a visit to Northern Nigeria by Mr. J.B. Davies, Consultant Entomologist, to conduct a follow-up survey to assess the situation on onchocerciasis and S.damnorum in the Abuja area 10 years after commencement of control measures in 1954. Mr. Davies was one time Entomologist in the Sleeping Sickness Service of this Ministry and carried out part of the original Simulium Survey in the area. The follow-up survey was conducted during the period May-August 1966; the Report on the findings is awaited through W.H.O.



22-23. Top, a Watts current meter used to measure the river's flow before applying insecticide.

Bottom, applying insecticide against *Simulium damnosum*, vector of Onchocerciasis (River blindness).

CEREBRO-SPINAL MENINGITIS.

11.1 During 1966 a total number of 5,699 cases of C.S.M. with 456 deaths (8%) were recorded for the entire Region as compared with 7,486 cases and 650 deaths in 1965. The highest incidence was in Katsina Province from where 1,098 cases with 71 deaths were reported. Neighbouring Sokoto Province had the highest mortality rate, reporting 1,076 cases with 104 deaths (9.6%). Comparative Provincial returns for the past 3 years are:-

PROVINCE	1964		1965		1966	
	No. of cases	No. of Deaths	No. of cases	No. of Deaths	No. of cases	No. of Deaths
ADAMAWA	40	9	52	18	74	17
BAUCHI	245	46	181	30	514	37
BENUE	30	5	26	9	59	9
BORNU	97	15	193	22	253	22
ILORIN	5	-	26	1	7	-
KABBA	14	4	21	1	76	16
KANO	284	20	664	68	695	79
KADUNA C.T.	131	10	57	4	40	2
KATSINA	365	35	2,994	183	1,098	71
NIGER	37	3	86	5	170	25
PLATEAU	152	8	226	16	868	22
SARDAUNA	5	-	23	7	340	22
SOKOTO	455	39	2,693	265	1,076	104
ZARIA	172	28	241	21	429	30
T O T A L	2,027	222	7,483	650	5,699	456

11.2 As mentioned in the Rural Health Report for 1965, the Sulphonamide drug "FANASIL" (Roche, RO 4-4393) was used for field trial by selected Medical Officers during the 1966-67 "epidemic season". Late in December 1966 drug was issued to Hospitals and Medical Field Units in the northern-most parts of the Region (stocks of the drug in ampoules for injection were supplemented by a supply gratis from the Manufacturers). Each issue was accompanied by full instructions as to its use together with a sufficiency of Treatment Sheets for the patients treated with "FANASIL". These treatment sheets would record details of clinical conditions, laboratory examinations, complications and side affects of the drug if any. The result of the trial will be analysed at the end of the epidemic and the data published in the Rural Health Report for 1967.

12. Y A W S.

12.1 There have been no initial treatment surveys in the Region since 1962.

12.2 Resurveys.

Approximately 1,077,364 people were examined during 1966: 176 infectious and 2,234 active cases were recorded. From the returns submitted by the various Medical Field Units in respect of their work done on the Yaws Eradication Programme during the year, the following figures have been extracted:-

<u>Unit</u>	<u>No. of People Examined.</u>	<u>No. of Inf. cases found.</u>
No.1 M.F.U.: Benue (part); Plateau Zaria and Sardauna Provinces	434,620	22
No.2 M.F.U.: Adamawa and Sardauna (part) Provinces	147,060	12
No.4 M.F.U.: Benue (part); Niger & Kabba Provinces	102,374	22
No.6 M.F.U.: Benue (part) and Kabba (part) Provinces	393,310	120
	<u>1,077,364</u>	<u>176</u>

Most of the infectious cases were again detected in the Igala-Idoma Divisions. In these divisions 120 persons out of 393,310 examined were found to be suffering from infectious yaws.

12.3 Regarding the Igala-Idoma Divisions phase of the yaws eradication campaign, in the Igala area only 23 infectious yaws cases were found out of nearly a quarter of a million people examined, as compared with 196 cases in 169,937 persons examined in 1965. The following table show the number of infectious cases found at resurveys in Idoma-Igala Divisions during the past 3 years:

Infectious yaws cases.

Year	Idoma Division	Igala Division
1964	125	130
1965	222	196
1966	97	23

The low number of infectious cases found in 1966 is attributed to the introduction of a new system of team work in conducting the resurveys. Previously, selected spot-surveys were done in various Districts of the Division at the discretion of the Rural Medical Officer in charge of the Project. From June 1965 in the Igala area a system of a combined team working together in a District, thus clearing one district within a short time, was introduced. This method reduces the chances of infections escaping the resurvey team as usually happened with spot surveys. The new method of a "sweeping" resurvey has reduced the incidence of yaws in the Igala Division. In the Idoma Division this method was not introduced, for various reasons, until March 1966, and it will not be until the next year before the efficiency of the method there is realized.

Dispensary Returns - Igala/Idoma Divisions.

12.4 Treatment in Dispensaries:

No. of infectious yaws cases.

Year	Idoma Dispensaries	Igala Dispensaries.
1965	132	20
1966	32	9

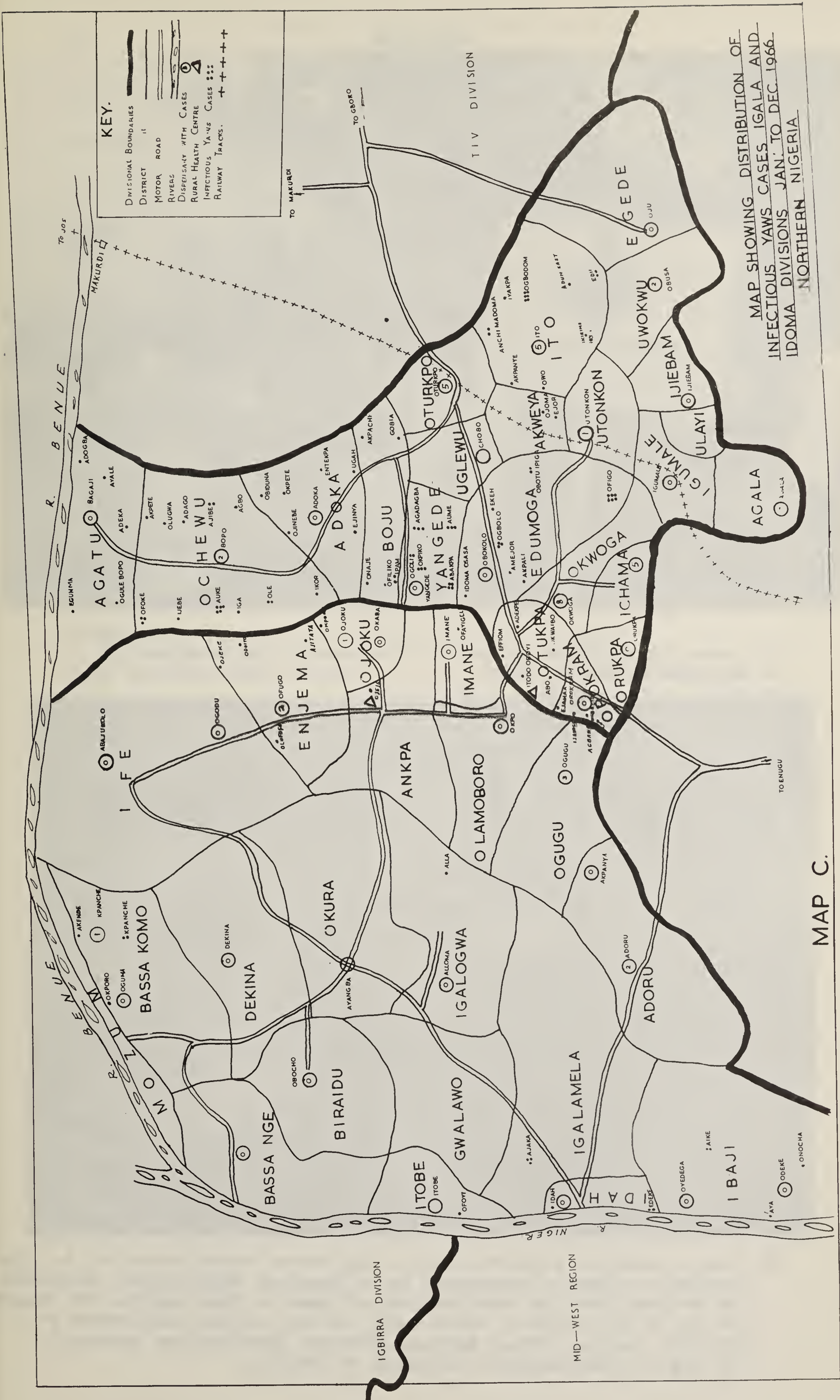
In areas where the sweeping method of resurvey has been done, the dispensary returns show a marked reduction of infectious cases. A thorough checking of cases reported from dispensaries is conducted by the team leaders in both Divisions.

Dispensaries returns from other districts in the yaws control project areas are summarized overleaf together with the yaws campaign resurvey return for 1966. The yaws resurvey teams also undertake vaccination against Smallpox in all their areas of operation. During the year the various teams engaged in yaws work vaccinated 910,850 persons and reported 84.6% successful primary vaccination takes. These teams also detected 1,193 leprosy cases which they referred to the nearest leprosy clinics for treatment.

Yaws Campaign Resurvey Return, 1966.

		1965	1966
	Persons Examined	1,105,665	1,077,364
Total for all Teams.	All active	3,727	2,234
	Infectious	486	176
	Contacts	99,027	22,606
	Treatments Given	117,032	31,429
Resurvey Teams	Persons Examined	1,105,665	1,077,364
	All active	3,727	2,234
	Infectious	486	176
	Contacts	99,027	22,606
	Treatments Given	117,032	31,429
Dispensaries	All active	398	286
	Infectious	286	82
	Contacts	1,082	675
	Treatments Given	3,765	1,126
Grand Total	All active	4,125	2,520
	Infectious	772	258
	Contacts	100,109	23,281
	Treatments Given	120,797	32,555

12.5 In September 1966, the Canadian High School Students Movement "War against Yaws" (later to known be as "SWAY") donated to the Northern Nigeria Ministry of Health a gift to the value of 5,200 dollars to be used for eradication of Yaws in the Region. The gift consisted of a Landrover, 20,000 vials of Penicillin, a quantity of needles for injection and various other items of medical equipment. The donation which was received on behalf of the Northern Nigeria Government by the Acting Permanent Secretary to the Ministry of Health was presented through the W.H.O. Representative in Nigeria. A photograph of the presentation ceremony is at page 94.





24. Local inhabitants gather at Dispensary for examination by Yaws Resurvey Team.



25. Drugs, medical equipment and a Landrover were presented to the Northern Nigeria Government by a Canadian High School Movement to be used for the eradication of Yaws in the Region. Dr. Nugent of the W.H.O. (Right) hands over the key of the Landrover to Dr. J.D. Soleye, Chief Medical Officer (Preventive Service) of the Northern Nigeria Ministry of Health.

13.1 Vaccination against Smallpox and assessment of the results of vaccination is an important part of the work of Rural Health Auxiliaries. Medical Field Unit Staff, who are considered to be multi-purpose health workers, perform Smallpox vaccination as a routine procedure in addition to their other duties connected with yaws campaigns, leprosy case finding, anti-tuberculosis surveys and immunisation, epidemic control, etc. From the returns submitted from Rural Health Units and Centres in respect of the work done during 1966, the following figures have been extracted:-

<u>Unit.</u>	<u>No. Smallpox Vaccinations performed.</u>
1, 2, 4 & 6 M.F.U.s.	909,413 (Combined total)
3 MFU. & R.H. Centre	48,604
5 MFU. & R.H. Centre	14,983
R.H. Centres Igalala/Idoma	480 (Primaries at C.W. Clinics.)
Total =	<u>973,480</u>

Freeze dried or lanolated Smallpox vaccine, produced at the Federal Medical Laboratories, Yaba, is used subject to availability.

Provincial Smallpox vaccination returns for 1966 from the Urban Health Section of this Division are given on the following page. These do not include the above figures.

Total Vaccinations done and Smallpox Incidence during 1966.

Province	No. Vaccinated	Inspected	Successful	Percentage Successful	No. Cases Reported	No. Deaths Reported
Adamawa	131,052	102,099	83,497	82	20	1
Bauchi	364,303	285,704	277,891	80	131	16
Bornu	380,471	335,067	161,170	49	164	11
Benue	82,585	55,170	44,125	80	157	20
Ilorin	106,898	100,204	98,624	98	40	6
Kabba	372,843	220,402	182,936	83	151	10
Kano	286,189	19,135	13,926	73	917	72
Katsina	127,296	97,552	65,362	67	504	35
Niger	304,778	217,547	184,647	85	578	54
Plateau	176,641	109,062	79,168	72	56	9
Sardauna	61,010	41,246	31,205	75	3	-
Sokoto	225,308	135,452	112,540	83	680	85
Kaduna C.T.	44,892	38,433	33,706	88	19	-
Zaria	126,811	108,181	85,964	79	22	-
T O T A L	2,791,077	1,865,254	1,454,761	77	3,442	319

14.1 During the period 9th - 16th May 1966, a team from No.4 Medical Field Unit in Keffi, headed by a Medical Field Unit Assistant specially trained in the techniques of urine examination and stool concentration tests for Schistosomiasis visited the Sugar Company's Estate at Bacita in Ilorin Province. It was intended that the team should re-examine urine and stool specimens from about 250 of the Company's staff previously examined in November - December 1965. Unfortunately owing to the disturbances in the country prevailing at the time of the team's visit and for a variety of other reasons, only 78 of those previously examined were available for re-examination. Stools of 64 out of these 78 persons were collected and tested by a concentration method at Kaduna laboratory. Out of the 64 stool specimens 30 were positive for S.mansoni. 10 out of these 30 were positive in the previous examination and were still positive when re-examined. Only six specimens which were positive in the past survey were found negative in the second survey.

71 specimens of urine from those previously examined were tested for S.haematobium ova. The result showed that 14 of these were still positive.

In addition 30 specimens of stools and 33 urines from the new staff were examined. 7 Urines were positive for S.haematobium and 7 stools positive for S.mansoni. See table overleaf.

All workers found infested during 1965 surveys were treated with Amblihar or with a Schistosomicide. The high rate of positive results during the resurvey suggest the probable source of infection being the stream Ndofa which is used for bathing and washing by the villagers. If the conditions are favourable it is proposed to train Medical Field Unit staff in identification of snails and to take necessary steps to control the disease.

SCHISTOSOMIASIS SURVEY - BACITA SUGAR ESTATE.

Number of workers re-examined = 78.

STOOL INVESTIGATION.				URINE INVESTIGATION	
No. of stools re-examined	No. of stools positive on re-examination	No. of stools positive on first as well as on second examination.	No. of positives which were negative on previous examination.	No. of Urines re-examined	No. of Urines still positive on re-examination.
64	30	10	6	71	14

New workers examined for the first time:-

	<u>No. Examined</u>	<u>No. Positive.</u>
URINE	33	7
STOOL	30	7



